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Assessment and Collection of Noncompliance Penalties by EPA and Approval of State Noncompliance Penalty Program

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 66 and 67

Assessment and Collection of Noncompliance Penalties by EPA and Approval of State Noncompliance Penalty Program

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The regulations below establish the procedures by which EPA and participating States will assess and collect noncompliance penalties under Section 120 (42 U.S.C. 7420) of the Clean Air Act (42 U.S.C. 7401 et seq.) ("the Act"). The purpose of these mandatory penalties is to recover the costs a source avoids by not complying with Clean Air Act requirements. These regulations define which sources are subject to the noncompliance penalty, how the penalty is calculated, and the criteria for obtaining an exemption. The regulations also set forth the means by which the States may be delegated the authority to administer the noncompliance penalty program.

DATES: Effective date October 27, 1980.

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SUPPLEMENTARY INFORMATION: The Clean Air Act Amendments of 1977 (Pub. L. 95–95) added Section 120 to the Clean Air Act (42 U.S.C. 7420). This section requires promulgation of regulations for the assessment and collection of noncompliance penalties against stationary source violators of certain requirements of the Clean Air Act. To calculate the economic benefits of noncompliance, EPA has developed a mathematical model and computer program that is set forth in Appendices A–C, below. EPA will supply, at nominal cost, a listing of this computer program for time sharing computers that calculate the penalty. This program listing may be obtained by writing to Director, Division of Stationary Source Enforcement at the address listed above.

Summary of Final Regulations

I. Background

The majority of the Nation's 23,000 major sources of air pollution are in compliance with State and Federal Clean Air Act requirements, but a substantial number are not. Many of these noncomplying sources emit particularly high levels of pollutants. For example, many noncomplying steelmaking facilities emit great quantities of particulate matter, while noncomplying electric power plants are significant sources of sulfur dioxide emissions. In many cases, these violators have not yet complied with applicable deadlines (usually mid-1975) related to attainment of National Ambient Air Quality Standards for the protection of public health.

Sources that have violated the law by failing to install and operate pollution control devices or to take other steps necessary to achieve compliance have enjoyed, either directly or indirectly, an economic advantage. The possibility of economic savings constitutes an incentive to delay or avoid compliance. Before the 1977 Amendments to the Clean Air Act, the regulatory and enforcement measures authorized by the Act did not include direct economic incentives to comply promptly. Section 120, added by the 1977 Amendments, required EPA to assess and collect an administrative penalty designed to capture the economic savings resulting from certain periods of noncompliance. Beginning from the date the source receives a notice of noncompliance, a penalty will be assessed to recover the costs avoided thereafter by a source as a result of its failure to comply.[1]

On March 21, 1979, EPA published its proposed noncompliance penalty regulations and economic model (44 FR 17309). On June 15, 1979, EPA published a supplementary Notice (44 FR 34524). The supplementary Notice listed some minor errors in the computer program, and reprinted EPA's proposed Instruction Manual (Appendix B), portions of which were not reproduced clearly in the original proposal. The supplementary Notice also proposed for public comment an alternate data source for determining the discount rate (one of the model parameters) and the appropriate amount of the initial penalty payment.

EPA received numerous comments on these proposals. These comments are summarized and discussed below, and in a Responses to Comments document that precedes Appendix A, and a Responses to Comments document that has been placed in the public docket. Where appropriate, changes have been made to the regulations and economic model.

II. Applicability of Regulations

A. Applicability to Sources. Section 120 requires that noncompliance penalties be assessed against three classes of sources. First, penalties must be assessed against any major stationary source that is violating any emission limitation, emission standard or compliance schedule under an applicable State implementation plan (SIP). The only exception to this rule is for violations of sulfur oxides emission limitations by primary nonferrous smelters that have received primary nonferrous smelter orders under Section 119 of the Act.

The second class of sources subject to the penalty is stationary sources (regardless of size) that are violating any emission limitation, emission standard, standard of performance or other requirement established under Section 111 (New Source Performance Standards) or Section 112 (National Emission Standards for Hazardous Air Pollutants) of the Act.

Finally, a source may be required to meet interim requirements or compliance schedules contained in an extension, administrative order, consent decree, court order, or suspension. Failure to comply with any of these interim requirements or compliance schedules will subject the source to penalties for such failure. This includes a primary nonferrous smelter that is violating any interim requirement of a primary nonferrous smelter order.

Sources on Consent Decrees

The final regulations are applicable to sources on consent decrees. Comments argued that sources that have agreed to Federal or State consent decrees should be automatically exempted from the penalties, either because to do otherwise constituted impermissible EPA review of court action or because an exemption is implied by the provisions of Section 120(a)(2)(A)(iii).[2]

EPA disagrees with both arguments. Section 120(a)(2)(A)(i) provides that a major stationary source in violation of a SIP requirement is subject to the penalty

[1] The noncompliance penalty is designed to recover the economic benefit gained by a noncomplying source from the date on which it receives a notice of noncompliance until final compliance is achieved. In order to capture savings realized from earlier noncompliance, EPA may seek penalties in a civil judicial action pursuant to Section 113(b). The relationship between § 113 and § 120 penalties is discussed below.

[2] Section 120(a)(2)(A)(iii) provides that a source that violates "any interim emission control requirement or schedule of compliance under such . . . consent decree" shall pay a noncompliance penalty equal to the economic value of noncompliance with the interim requirement or schedule contained in the consent decree. Commenters argued that since Congress provided that sources violating consent decrees will be assessed penalties, Congress must have intended that sources in compliance with decrees be automatically exempted.

whether or not it is subject to a consent decree. This is logical since a source enjoys an economic benefit from delay even if the delay is court sanctioned and because separate provision is made to exempt those delays for which assessment of a penalty would be inequitable.

Section 120(a)(2)(A)(iii) does not by implication repeal what Congress provided in Section 120(a)(2)(A)(i), but imposes an additional requirement. It requires the recovery of savings resulting from failure to comply with any interim requirements contained in the decree, even if these requirements are not part of the final compliance strategy. For example, a noncomplying source that will meet SIP SO_2 requirements by installing a scrubber will be assessed a penalty based upon the savings realized by not having installed this scrubber after the date of notice of noncompliance. (Section 120(a)(2)(A)(i)). Installation of the scrubber and final compliance, however, may take several years. If the same source is required by the consent decree to reduce emissions in the interim (e.g., by burning lower sulfur fuel), the costs associated with meeting the interim requirement, assuming it is not part of the final compliance strategy, will not be considered in calculating the initial penalty. Failure to purchase and burn such fuel, however, results in an economic benefit independent of that gained by not having installed the necessary scrubber. Subsection 120(a)(2)(A)(iii) requires EPA to recover this economic benefit.

As noted below, however, sources that have agreed to, and are meeting a compliance schedule contained in a consent decree will generally be assigned a lower priority for Section 120 actions. In addition, a source that has agreed to a Federal or State consent decree may be eligible to petition for an exemption based upon an inability to comply for reasons entirely beyond its control. Eligibility for such exemptions is discussed below.

"Major Stationary Source"

EPA's proposed noncompliance penalty regulations defined "major stationary source" as one that at full capacity, and in the absence of pollution control equipment, emits or has the potential to emit one hundred tons per year or more of any air pollutant regulated under the Act. Potential emissions were to be calculated assuming operation at maximum capacity in the absence of control equipment. This definition was consistent with EPA's Prevention of Significant Deterioration (PSD) regulations promulgated on June 19, 1978 (40 CFR 52.21(b)(3)).

On December 14, 1979, the U.S. Court of Appeals for the District of Columbia rejected EPA's definition of "major stationary source" in the PSD regulations. In *Alabama Power Co.* v. *Costle,* (No. 78–1006 (D.C. Cir.)), the Court held that, for purposes of PSD pre-construction review, a source is "major" only if it actually emits 100 tons per year or more, or has the potential, when operating at full design capacity, to emit that amount. Design capacity should take into account both the maximum productive capacity of the source and the design of air pollution controls.

The *Alabama Power* court also addressed the issue whether fugitive emissions could be counted in determining whether a particular facility is a "major stationary source." The court held that EPA must undertake rulemaking in order to include fugitive emissions.

On September 5, 1979 the Agency proposed revisions to its PSD regulations (44 FR 51924). New definitions of "major stationary source" and "potential to emit" were proposed in accordance with the *Alabama Power* requirement. Included in that proposal is a new fugitive emission regulation which would provide for inclusion of fugitive emissions from 26 categories of industrial sources in determining their status as major sources.

The noncompliance penalty regulations promulgated today include definitions of "major stationary source" and "potential to emit" consistent with those contained in EPA's proposed PSD rulemaking. (Should those definitions change as a result of comment, corresponding amendments will be proposed to these regulations). Thus, for purposes of Section 120, a facility is a major stationary source if, at the time it receives a notice, it has actual emissions of 100 tons per year or more of any air pollutant regulated under the Act or has the capability, a maximum design capacity, to do so considering any air pollution control equipment which is in place. Fugitive emissions will be considered in determining annual emissions for those stationary sources whose fugitive emissions are regulated by the applicable State implementation plan, to the extent that such emissions are quantifiable.

EPA may determine a source's annual emissions from emissions data collected over a period of time shorter than one year. If this data, when projected over one year, would exceed 100 tons, EPA will consider the source to be "major" for purposes of Section 120.

B. Applicability to Acts and Failures to Act. In most instances, noncompliance results from a failure to install control equipment or to use appropriate fuels. In some cases, however, noncompliance results from failure to operate and maintain pollution control equipment or other process equipment or from failure to follow other necessary work practices so as to ensure continuous compliance. Both types of violation can lead to assessment and collection of a noncompliance penalty.

C. Setting Priorities. EPA must establish priorities for conducting noncompliance penalty actions if it is to implement the program in a rational and consistent manner. EPA's limited resources are insufficient to implement the stringent procedural requirements of the statute simultaneously for the large number of sources that are potentially subject to penalties.

Section 120 requires the Administrator to issue a notice of noncompliance within 30 days after discovering a violation. Receipt by the source of the notice triggers certain procedural deadlines and begins the accrual of penalties under these regulations. The source has 45 days to calculate its penalty or to petition for an adjudicatory hearing. EPA then has 30 days to review the source's submittal and, if necessary, grant a hearing. Final decisions on petitions must be rendered within 90 days of the hearing request.

EPA estimates that approximately 2,000 major stationary sources may be in violation of applicable Clean Air Act requirements and thus potentially subject to noncompliance penalty actions. This number includes a large number of sources that have never achieved initial compliance. Were all sources believed to be liable for noncompliance penalties to receive notices of noncompliance upon the effective date of these regulations, the resulting volume of calculations and petitions would far exceed the resources available to process them within a reasonable time. EPA believes that Congress did not intend to disrupt, reduce, or suspend implementation of other provisions of the law related to environmental protection when it enacted Section 120. A severe curtailment of other programs would result, however, if EPA attempted to proceed simultaneously against all violating sources within the statutory time frames. One important example of this potential disruption is the stationary source enforcement program itself, where many judicial actions are now underway to obtain injunctive relief

against violators pursuant to Section 113. Reassigning resources now devoted to that effort would adversely affect EPA's ability to assure that violators are placed on, and complying with, enforceable compliance schedules.

EPA will, therefore, implement the noncompliance penalty program in a manner which will maximize the use of limited resources. EPA will proceed initially against sources that have never achieved compliance with Clean Air Act requirements and are not complying with enforceable compliance schedules contained in federal or EPA-approved State consent decrees and administrative orders. Other factors EPA will consider in setting priorities include the size of the economic benefit enjoyed, the nature and amount of the source's emissions, and whether the emissions are causing or contributing to a nonattainment situation. EPA will not issue notices of noncompliance to sources which it considers to be economically unable to both pay the penalty and meet pollution control requirements without shutting down, and to sources it considers probably entitled to an exemption.

Proceeding initially against sources that have not agreed to enforceable compliance schedules is consistent with one of the principal purposes of Section 120, that of achieving compliance. Source owners that are complying with enforceable compliance schedules have begun to reduce the level of economic benefits attributable to noncompliance, whereas the source owner that has not agreed to a schedule continues to maximize these economic benefits of delay. This priority scheme also is consistent with the philosophy of the Act's enforcement mechanisms, which is to achieve early compliance with air pollution control requirements. Taking account of the nature and impact on ambient air quality of the source's emissions is consistent with EPA's mandate to protect the public health. Therefore, violating sources that are most severely impacting the public health could generally expect to receive higher enforcement priority than those with minor or insignificant impacts. Similarly, EPA believes it is appropriate to recognize that the imposition of penalties against sources in financial difficulty, but which are moving towards compliance, could slow down the source's compliance efforts by tying up funds that otherwise would have been used for pollution control equipment. EPA does not intend to implement the noncompliance penalty program in a way that will force the closure of such sources.

Finally, EPA generally will refrain from issuing notices of noncompliance where it appears certain that a source is entitled to an exemption from the penalty. It will also allow the source to avoid the inconvenience and possible adverse publicity or impact on its ability to secure capital that might arise from having to respond to a notice of noncompliance. If probable entitlement to an exemption is not clear, a notice of noncompliance ordinarily will issue.

D. Applicable Dates. 1. *Implementation of the Regulations.*—The noncompliance penalty regulations promulgated today will become effective October 27, 1980. EPA believes it would be desirable to delay actual implementation for a reasonable period of time, and has therefore decided to delay general implementation of the program until January 1, 1981. This action has been taken for two reasons. First, it will take several months for the Agency to make available and train the personnel to run such a far-reaching, procedurally complex program.

Additionally, implementation of this program must be coordinated with EPA's administration of its judicial enforcement program under Section 113 of the Act. EPA's decision to set priorities for notice issuance based upon the source's commitment to an enforceable compliance schedule under Section 113 should encourage many sources to request schedule negotiations. Delaying the implementation of the noncompliance penalty program until January 1, 1981, should enable EPA to complete many of these negotiations. For sources that are unwilling to negotiate, EPA will use this period to obtain additional evidence of violation. Finally, EPA will use this time to work closely with those States that are interested in accepting a delegation of authority to administer the noncompliance penalty program.

The result of all of these activities will be that on January 1, 1981, EPA and the States will be in an improved position to proceed expeditiously against the maximum number of violating sources. This is consistent with the legislative intent of Section 120.

Comments argued that Section 120, as a matter of law, prohibits EPA from assessing noncompliance penalties prior to 18 months after promulgation of the final regulations. These comments argued that the Act required EPA to promulgate final regulations no later than February 7, 1978. Since the earliest date for imposition of the penalties was to have been August 7, 1979, it was asserted that Congress must have intended that sources be given 18 months to study the final regulations prior to assessment of the penalty.

EPA disagrees. There is nothing in the Act or legislative history which indicates that EPA's authority to assess penalties as of August 7, 1979, is dependent upon having promulgated final regulations 18 months earlier. Rather, the August 7, 1979, date has independent significance as the date on which the two year grace period permitted by Congress in the 1977 amendments came to an end.

2. *Relationship Between Civil and Noncompliance Penalties.*—Delaying the implementation of this rulemaking could have the effect of allowing some sources to continue to benefit from their noncompliance during the period prior to January 1, 1981. To minimize this possibility, EPA has amended its Civil Penalty Policy applicable to civil judicial actions pursuant to Section 113 of the Clean Air Act. As originally promulgated, that policy provided that EPA would seek to recapture the economic value of noncompliance from August 7, 1977, to August 7, 1979. Certain factors besides economic benefit could be considered to mitigate or increase the penalty as appropriate. The economic benefit attributable to delayed compliance after August 7, 1979, was to be recaptured in a noncompliance penalty assessment pursuant to Section 120. The amendment to the Civil Penalty Policy provides that, for purposes of determining Section 113 civil penalties, EPA will calculate the economic benefit of noncompliance to a source owner until January 1, 1981, instead of the original August 7, 1979 date. Thus, there will still be a strong incentive for a source to come into compliance expeditiously in order to minimize civil penalties pursuant to Section 113(b).

E. Issuance of Notices and Commencement of Penalty Period. EPA has not issued any notices of noncompliance to date and will not issue any such notices until after January 1, 1981. The penalty will be calculated from the date a source receives its notice of noncompliance. This represents a change from EPA's March 21 proposal. The proposal was based upon the language of Section 120(d)(3)(C)(ii), which provides that the penalty is calculated from the date of issuance of a notice of noncompliance. Comments received pointed out that, because of possible delays in mail delivery, a source could have fewer than 45 days in which to calculate a penalty, challenge the notice of noncompliance, or petition for an exemption. The change made today will allow all sources the 45 days provided by the Act to submit a

response to the notice. Calculating penalties from receipt of the notice should have only an insignificant effect, if any, on the amount of the penalty actually paid. The penalty is calculated on a monthly basis, with the amount of the penalty dependent upon the number of months the source is out of compliance. Since only a small time difference should ever exist between issuance and receipt of the notice, the number of months of noncompliance will be unaffected.

As provided in Section 66.12(b), all notices will be transmitted either by personal service, or by registered or certified mail, return receipt requested. Thus, there should be no uncertainty about the date on which the penalty begins to accrue and from which the 45 day period for response begins to run.

F. The Effect of SIP Revisions. 1. *Effect of Section 120(g).*—As noted in the March 21 proposal, Section 120(g) provides, in effect, that the earliest date for imposition of penalties based on violations of SIP requirements approved or promulgated by EPA after August 7, 1977, is the date of promulgation, or the date on which the source must demonstrate compliance with the new requirement, whichever is later, but in no event later than three years after the approval or promulgation of the new requirement. The time for final compliance will be specified in the SIP itself. If the SIP requires final compliance at a future date, the source will not be subject to noncompliance penalties until that future date, provided it satisfies any interim or incremental requirements specified in the SIP. If the SIP revision requires that the source achieve final compliance immediately, the source will be potentially liable for violations of these requirements as of the date of receipt of a notice of noncompliance or the effective date of the SIP regulation, whichever is later.

Comments received by EPA argued that assessing penalties against sources subject to immediately effective regulations would be unfair since immediate compliance might not be possible.

EPA has encouraged States submitting SIP revisions that impose new or more stringent emission limits to include compliance schedules in the compliance regulations and to provide for a future date for final compliance which is as expeditious as practicable. Nothing in the Act, however, prohibits a State from requiring that a source comply immediately and Section 116 reserves this determination to the States. If a State chooses to submit an immediately effective regulation that is approved by EPA as part of the SIP, Section 120(g) clearly provides that a source violating that regulation is subject to the noncompliance penalties.

A source faced with an immediately effective SIP may, in some circumstances, qualify for an exemption for inability to comply for reasons entirely beyond the source's control. In order to petition for this exemption, the source must have received an administrative order issued or approved by EPA, or an EPA-approved State or Federal consent decree. All exemption requests will be evaluated on a case-by-case basis in accordance with Subpart D of these regulations.

Alternatively, a source unable to comply with an immediately effective SIP requirement might seek a variance from the State which imposes an expeditious compliance schedule. If this variance were approved by EPA as a formal SIP revision under Section 110 of the Act, it would amend the SIP and change the date for compliance with the immediately effective requirement. To obtain EPA approval, the State would have to demonstrate that granting the variance would not prevent the attainment and maintenance of the national ambient air qualify standards as required by Section 110 of the Act and that the new compliance date was as expeditious as practicable. Upon approval by EPA, the source, if in compliance with the provisions of the variance, would not be subject to any additional noncompliance penalties.

2. *Applicable Dates for Carbon Monoxide And Ozone Requirements.*—As noted in the March 21 proposal, Section 120(g) of the Act provides that, in the case of new, more stringent requirements approved or promulgated by EPA after August 7, 1977, the date for imposition of a noncompliance penalty could not be later than three years after approval or promulgation by EPA of the new requirement. EPA also pointed out in the proposal that Section 120(g) appears to conflict with Section 172(a)(2) of the Act, which provides that States with areas which will not attain the national ambient standards for carbon monoxide or ozone by 1982 must revise their SIPs by the beginning of 1982 to show attainment by the end of 1987. EPA reasoned that major stationary sources subject to requirements under the 1982 SIP revisions could be allowed until as late as the end of 1987 to comply with those requirements, and that it would be inconsistent with that to interpret Section 120(g) to apply noncompliance penalties to them three years after approval of the 1982 SIP, *i.e.*, approximately mid-1985. The resolution of this apparent conflict proposed by EPA was that Section 172(a)(2) was the more specific provision and should govern. EPA therefore proposed not to impose penalities after mid-1985 on sources that have a later compliance date approved under the 1982 SIP.

After considering the issue further and evaluating the comments received, EPA has decided that Section 120(g) is the more specific provision, not Section 172(b)(2). The latter section addresses *attainment* of national ambient air quality standards; it does not mention sources' *compliance* with SIP requirements. Section 120(g) directly addresses compliance requirements for sources covered by the 1982 SIP in providing that noncompliance penalities are applicable beginning three years after SIP approval or promulgation.

The 1987 attainment deadline in Section 172 does not necessarily mean that Congress intended for major stationary sources to have until as late as 1987 to comply with requirements imposed in 1982. Though it is true that attainment by the end of 1987 will be accomplished, in part, by major stationary sources complying with necessary emission requirements, it is apparent from Section 172 and related sections in Part D that many sources would be necessary to show attainment. It is also apparent from Part D and its legislative history that Congress adopted the 1987 deadline principally to give States and localities considerable time to solve difficult and novel problems involving major shifts in urban transportation uses.

EPA must harmonize statutory provisions as much as possible, however, and considers that the relationship of Section 120(g) and Section 172(b)(2) requires further study. Section 120(g) may mean that no major stationary source regulated under a 1982 SIP may legally have a compliance date later than three years from approval or promulgation of the SIP, that a source may have a lengthier compliance schedule in the SIP but must be assessed the value of economic savings after three years even if in compliance with its schedule, or that (as in the proposal) the penalties may not be imposed three years after approval or promulgation of the SIP if a source has a lengthier compliance schedule under the SIP.

The Agency will announce a final interpretation and policy on applying noncompliance penalities to 1982 SIP sources in time to provide the States and other interested persons with guidance necessary for preparing those SIPs. At this time, EPA believes that the only essential action on this issue is the withdrawal of its proposed

interpretation that would have barred applying noncompliance penalties to 1982 SIP sources with compliance schedules longer than three years from approval or promulgation.

3. *Continuity of Existing SIP Requirements.*—SIP revisions submitted pursuant to the requirements of Part D of the Act (Nonattainment Areas) are expected to establish requirements for some sources that are more stringent than existing requirements. As EPA stated on April 4, 1979, any source subject to new, more stringent, SIP requirements must at least meet the requirements of the predecessor SIP until such time as it has demonstrated compliance with the new, more stringent, requirements. (*See,* 44 FR 20374). Keeping the predecessor SIP requirements in effect is necessary to prevent sources from operating uncontrolled or with less effective controls than now required while moving towards compliance with the new regulations. Violations of these pre-existing requirements will make the source subject to noncompliance penalties.

As was also noted, a narrow exception to this rule would occur when the new SIP regulations require control equipment that is incompatible with the continued operation of control equipment already installed. In such a case, the source may be excused from meeting the earlier SIP if, and only so long as, it is physically impossible to keep the existing equipment in operation while simultaneously installing the new device. This exception will be narrowly construed to apply only to the period during which an actual physical impossibility exists, (e.g., not during the design and contract phases of a new compliance schedule). Similarly, a source that was operating uncontrolled at the time the new requirement was adopted would normally not be eligible for this exception.

4. *Pending SIP Revisions.*—The final regulations authorize the assessment of penalties where a source is in violation of currently applicable requirements. Commenters argued that EPA should not assess noncompliance penalties against a source for which a SIP revision is pending, if the source would be in compliance with the revised SIP. EPA disagrees. Until a SIP revision is formally approved by EPA, the source is under a legal obligation to comply with the SIP that is in effect. Failure to maintain compliance with the effective SIP potentially subjects the source to noncompliance penalties. However, lower priority for issuing a notice of noncompliance might be given to a source that would be in compliance with the proposed SIP revision, provided that EPA determines that there is good reason to assume that the proposed revision is approvable (i.e., that it conforms to all requirements of Section 110 of the Act.)

5. *Stays of SIP Provisions.*—Commenters argued that EPA may not assess a noncompliance penalty based upon violations of a SIP provision that has been judicially stayed by a State court. A SIP that has been stayed, they argue, is of no effect and cannot form the basis of an alleged violation.

EPA is studying this issue further in light of the recent District Court opinion in *Illinois* v. *Commonwealth Edison Co.* (Civ. No. 78 C 2675, N.D. Ill. Feb. 19, 1980), and will announce its position as soon as this analysis is completed.

III. Procedures for Assessment, Calculation and Payment of the Noncompliance Penalty

A. Issuance of Notice of Noncompliance. Receipt of an EPA or State-issued notice of noncompliance is the trigger for assessing and collecting the noncompliance penalty. The notice will inform the source of its duty to calculate the amount of its penalty and schedule of payments as required by Section 120(b)(4)(A) (based on instructions contained in an enclosed Manual and Technical Support Document), and of its right to petition for a hearing to challenge the finding of noncompliance or to claim an exemption. The source must, within forty-five days of receipt of the notice, either calculate the penalty and payment schedule, or submit such a petition. In conformity with the structure of the Act, EPA will require that the source owner's penalty calculation demonstrate that compliance will be achieved as expeditiously as practicable.

Where a source does not properly submit data adequate to support its penalty calculation and schedule, EPA may enter into a contract to determine the amount of the penalty and the payment schedule applicable for that source. EPA's proposed regulations provided that the costs of such a contract would automatically be added to the amount of the source's penalty. Comments received generally argued that automatic imposition of these costs would be unwarranted.

The decision to impose such costs is discretionary, and the final regulations have been amended accordingly. In exercising its discretion, however, EPA will generally add these costs to the amount of the penalty.

B. Calculation of the Penalty. 1. *Components of the Penalty.*—Section 120 of the Act provides for a penalty of not less than the economic benefit of delay to the owner or operator of the source. The Act specifies that, in determining this benefit, EPA consider three components: (1) the quarterly equivalent of the capital costs avoided; (2) the operation and maintenance costs avoided; and (3) "any additional economic value which such a delay may have for the owner or operator of such source." [3]

The economic model proposed in the March 21 **Federal Register** takes into account the first two components described by Congress, but does not take into account the third component, i.e., "any additional economic value".

EPA believes that, at present, it is not possible to quantify and calculate the additional economic value of noncompliance in an administratively manageable fashion. Should it become evident, however, that the additional values not described by the model are in fact so calculable, EPA will propose for public comment appropriate changes to the economic model.

Section 120(d)(3)(A) of the Act specifies that all penalty payments after the first payment must be equal. The legislative history of the Act indicates that this provision should be interpreted as equality in real dollar terms. That is, if inflation is expected to cause costs to escalate, that escalation ought to be reflected in the noncompliance penalty (123 Con. Rec. S. 13698 (daily ed. Aug. 4, 1977)). A penalty that does not rise with expected inflation, but merely averages inflation, would over-recover the savings from noncompliance in the early years of the penalty and under-recover the savings in the final years. Therefore, the model adopted by the regulations automatically escalates each quarterly assessment in an amount equal to the quarterly inflation rate.

2. *The Model.*—EPA's model calculates the economic benefit of

[3] The first component arises because owners of sources that have not invested in required air pollution controls have had the opportunity to invest their funds instead in projects that yield a direct economic benefit to the firm. The second component of savings from delayed compliance results from avoidance of the operation and maintenance costs that would have been incurred if the source had complied. These include labor, raw materials and energy costs, as well as any other expenditures directly associated with the operation of the pollution control equipment. In addition, certain operation and maintenance costs may be required to achieve compliance even where no pollution control equipment is required. Delaying compliance means that these expenditures have been avoided and that the source owner had the opportunity to invest these funds in projects yielding a direct economic benefit. The noncompliance penalty recovers these savings.

noncompliance by comparing two cash flows, that which the source would have experienced had it achieved compliance on the date it received a notice of noncompliance, and that which it is estimated it will experience as a result of its delay. Because these cash flows occur at different times, a basis of comparison is provided by discounting them to their present value equivalents. The model then calculates the difference between these two cash flows and the proper quarterly payment schedule that the source must follow. The same model is used to make a final calculation when the source has achieved compliance. (The model is explained in greater detail in the Technical Support Document, Appendix A to these regulations.)

3. *Conclusive Effect of EPA's Model.*—The model established by these regulations will be the only model used to compute the penalty. Any penalty calculation differing from the one obtained by using EPA's model will not be accepted. Comments argued that EPA's model should be of presumptive, rather than conclusive effect and that if another model more closely approximated the actual costs avoided by noncompliance, EPA should accept that model or those results.

EPA disagrees. There is nothing in the Act or legislative history which indicates that sources should be free to use methods of calculation that are inconsistent with those developed by EPA. Use of other models that achieved similar results would mean duplication of effort and would unduly complicate the task of verification. EPA analysis of other models showed in addition that some alternative models did not satisfy the intent of Section 120. Some models proceeded on the assumption that the penalty should be limited to the amount of benefit from delay ultimately experienced by the source's shareholders, while others computed short-term benefits only. These models are discussed in greater detail in the responses to comments.

4. *Inputs to the Model.*—A separate set of comments resulted from EPA's designation of sources for inputs. The model itself utilizes twelve financial parameters, (1) the firm's projected capital investment schedule, (2) its projected schedule of operation and maintenance expenses, (3) the investment tax credits and (4) depreciation-related tax benefits associated with the installation of pollution controls, (5) the useful life of the control equipment, (6) the firm's marginal income tax rate, (7) an inflation rate, (8) discount rate, (9) interest rate, (10) preferred stock dividend rate, and the portion of the firm's long-term financing provided by (11) equity and (12) preferred shareholders and debtholders. These parameters are based on generally accepted principles of financial and economic theory. The impact of each of these inputs on the penalty, and the sources for obtaining them are discussed in detail in the Technical Support Document.

Six of the parameters listed above are specific to the noncomplying source. The remaining parameters are based on industry or national averages. EPA will require the use of a specific industry average for the inflation rate and the rate of return on shareholder's equity and a national average for useful life, interest on debt, and rate of return on preferred stock. For the discount rate the model uses the higher of the industry average or all manufacturing average rate of return on shareholder equity. Comments argued that sources of inputs other than those designated by EPA should be used. It was argued, for instance, that use of an historical rate of return on equity does not provide an accurate measure of the investment opportunities faced by a particular noncomplying source.

EPA disagrees. The noncompliance penalty is designed to recover the long term opportunity costs avoided by the noncomplying firm. This requires an analysis of the investment opportunities available to a source owner as of the date he receives a notice of noncompliance. Source-specific data are not an accurate estimator of these long-term investment opportunities. As profit maximizing investors, source owners are assumed to seek investment opportunities that yield a high rate of return. If the source is located in an industry that historically has experienced a high rate of return on investment, it may be assumed that the source will continue to invest in that industry. If the source is in an industry that has experienced a low rate of return, it may be assumed to invest in alternative industries at a rate approximating the all-manufacturing rate of return.

Apart from the appropriateness as a matter of theory of using industry-wide data, the use of a source-specific rate of return would introduce unnecessary complexity into the administration of the program. Verifying the accuracy of the inputs used by the source in its calculation would require an expensive and time-consuming analysis of the source's financial records and accounting practices. It would also be difficult for EPA or the State to calculate a penalty if the source failed to do so and the penalty had to be calculated on the basis of the source's financial records.

Another issue concerns updating of the various inputs to the initial penalty calculation when the final calculation is made. The proposed regulations provided that the discount and inflation rates and the equity and preferred share of investment were to be derived from the most recent five years of data available at the time the penalty was initially calculated. The same inputs were to be used in any interim or final penalty calculations. Comments received suggested that these inputs should be derived from, and limited to, data reflecting experience during the period of covered noncompliance.

EPA disagrees that the derivation of inputs should be limited to data from the period of covered noncompliance. As noted before, the penalty is designed to recapture the long-term opportunity costs available to the source as a result of delayed compliance. The returns realized by a firm in any particular year will not be representative of these long-term opportunities. To obtain a more accurate indication of these long-term rates EPA chose a five year average. Using a five year average smooths out some of the year-to-year fluctuations evidenced in the data which are not representative of long-term performance. In most cases, the period of covered noncompliance would be less than five years. For this reason, the use of rates computed over this period alone could be influenced by such fluctuations and would be a less accurate forecaster of long-term opportunities than a five year average.

EPA agrees, however, that for any given penalty calculation the input used should reflect a rolling average, i.e., the most recent five years of data available at the time that the penalty calculation is performed. Use of a rolling average will provide at least as accurate, if not superior, an estimate of such long term behavior as a fixed average. The provision that the data be available reflects the fact that data for the most recent year or two may not be available due to the lag in collecting and publishing the necessary information. Since the original calculation will have reflected a similar lag, and since the purpose is to average out fluctuations, the inclusion of the most recent year from the data does not warrant delay of the final calculation.

Rolling averages, however, will not be used for interim recalculation of the penalty. An interim recalculation will represent an effort better to approximate the penalty where there are

gross unanticipated changes, rather than an effort to adjust the penalty incrementally to match actual experience. As noted elsewhere, the decision to permit an interim recalculation is within the Administrator's discretion. Under these circumstances, it is generally appropriate to defer the use of a rolling average to the final recalculation.

Useful Life

The regulations require that the source owner or operator use the guidelines specified in Internal Revenue Procedure 77–10 for determining the useful life of pollution control equipment. This is the same data source specified in the proposed regulations. EPA selected the IRS guidelines because they are publicly available, and because they are familiar to business. Little comment was received on the propriety of using these guidelines for performing penalty calculations. (IRS supplements this data periodically. All presently available updates are reprinted in this rulemaking. Source owners or operators required to pay a penalty should check with IRS to determine if the relevant useful life figures have been amended.)

EPA believes that it may become possible to establish more accurate estimates of the useful life of pollution control equipment, ones which are based specifically on the life of that equipment. The useful life estimates contained in the IRS guidelines are not specific to pollution controls. EPA has commenced a study aimed at deriving these more accurate estimates. If this study results in useful life data for pollution control equipment for any source category, EPA will propose the data for public comment.

C. The Effect of Precompliance Expenditures. 1. *Expenditures Made Prior to Receipt of a Notice of Noncompliance.*—The noncompliance penalty is calculated only on the amounts that remain to be expended by the noncomplying source as of the date on which the source receives a notice of noncompliance. Compliance expenditures already incurred by the source as of this date are no longer being avoided, and are not used to calculate the penalty. For example, if on the date it receives a notice a source had already spent $5 million of the $10 million in capital costs necessary to achieve compliance, the capital component of the penalty will be appropriately adjusted only to account for the $5 million that remains to be spent.

2. *Expenditures Made After Receipt of a Notice of Noncompliance.*—Section 120(d)(2)(B) provides that the noncompliance penalty must be reduced to reflect any expenditures made by the source during any quarter for the purpose of achieving or maintaining compliance "to the extent that such expenditures have not been taken into account" in the initial calculation. EPA's model accounts for all appropriate expenditures in the initial penalty calculation. To calculate a penalty, the source owner must first determine the total capital expenditures and the annual operations and maintenance (O&M) expenditures that must be made to achieve and maintain compliance. Each of these components is treated separately in the precompliance credit calculation. Second, the model requires that the source owner estimate in what months precompliance capital and O&M expenditures will be made. The timing of these expenditures is important because the longer a source owner delays an expenditure, the greater the opportunity to benefit from the alternative investment of funds.

After each entry of an anticipated precompliance expenditure, the model recalculates a penalty amount based upon the expenditures that still remain to be made. For example, assume that a source must spend a total of $10 million in capital and $250,000 each quarter in O&M to achieve continuous compliance. If, prior to the first quarter of covered noncompliance, the source spends $1 million of the necessary capital costs the model would calculate a new capital penalty amount based upon the $9 million in capital costs remaining to be spent. This amount represents the capital costs still being avoided by the source during the first quarter. If during the quarter $100,000 of O&M expenditures are incurred, the O&M portion of the penalty would be calculated based on the $150,000 of O&M expenditures that were avoided that quarter. This process is repeated after each anticipated expenditure during the period of covered noncompliance. The net payments for all the quarters of noncompliance are then discounted and summed to derive their total present value. This present value will then be converted into a series of escalating payments to take into account the effects of inflation.

The effect of this method of calculation is that precompliance capital expenditures act to reduce the source's penalty in the proportion that they bear to the total anticipated costs of compliance. In the above example, the source's first quarter expenditures of $1 million (capital) act to reduce the capital component of the penalty by 10% in all subsequent quarters. This reduction in the capital component of the penalty is cumulative. If prior to the following quarter the source were to spend another $1 million of the capital costs, the capital portion of the penalty would now be reduced by 20%.

O&M precompliance expenditures also reduce the O&M portion of the penalty in the direct proportion that they bear to the anticipated costs of compliance. If quarterly O&M expenditures of $250,000 will be required once the source achieves full compliance, quarterly precompliance expenditures of $100,000 will reduce the O&M component of the penalty by 40%. Unlike the capital component of the penalty, however, reductions in the O&M component are not cumulative. This treatment recognizes, and is consistent with, the different financial impacts experienced by a source that delays compliance. A source owner that delays compliance by one year merely postpones the necessary capital outlays for a similar period. Annual O&M costs that would have been incurred, however, are forever avoided, rather than merely postponed by the delay. This method of calculation is set forth in more detail in the Technical Support Document.

EPA received many comments on its proposed method of granting credits. These comments argued that a source should be able to deduct from its quarterly penalty assessment a dollar amount equal to that expended during that quarter for achieving compliance. EPA explained its reasons for rejecting "dollar-for-dollar" credits in its proposal. After consideration of the comments received, EPA has determined that the approach adopted in the proposal and in the regulations promulgated today is correct.

A dollar-for-dollar credit as described by commenters is not appropriate since it would prevent the recovery of the true costs avoided by the noncomplying source, and provide an incentive towards continued delay. EPA's model bases the penalty on the difference between two cash flows over time. EPA's credit mechanism recognizes that precompliance expenditures represent a relative acceleration of payments which alters the ratio between the two cash flows. Were the penalty calculation based on a model which computed an absolute rather than a relative total, a different credit provision might be required.

If EPA granted a dollar-for-dollar credit, many firms would in effect pay no penalty, thereby realizing, contrary to Congress' intention, a savings equal to the annual capital charges on the uncompleted investment. For example,

assume that in order to achieve compliance in one year, a hypothetical firm will make $12 million of capital expenditures at the rate of $1 million per month, and $1.2 million of O&M expenditures at $100,000 per month. In the absence of any consideration of credits, the penalty calculated in this example would be approximately $1.1 million. An illustration of the effects of EPA's credit mechanism on the penalty computation appears below. Column A lists the amount of the penalties in the absence of any consideration of credits. Column B sets forth amount of the penalty using EPA's credit mechanism. Column C shows the penalty amounts using a dollar-for-dollar credit.

	A—(No credits)	B—(With EPA credits)	C—(Dollar-for-dollar credits)
Quarter 1	$278,620	$75,220	$0
Quarter 2	284,490	76,810	0
Quarter 3	290,480	78,430	0
Quarter 4	296,610	80,080	0

[The present value of the payments from Column A is $1,093,430; the present value of Column B is $295,210. The present value of Column C is $0].

The firm receiving a dollar-for-dollar credit would pay no penalties because the quarterly precompliance expenditure of $3 million exceeds the quarterly penalty based on the comparative cash flows. However, the source would still have realized a benefit from delay in present value terms, since some expenditure remains unspent. Thus, the dollar-for-dollar credit prevents the capture of these savings and thereby directly violates the intent of Section 120. Failure to capture these savings could also result in the violating source receiving an unfair competitive advantage over one that did comply, another situation that Congress sought to prevent.

A dollar-for-dollar credit would also create, rather than reduce, incentives to delay compliance, thereby delaying attainment of air quality objectives. In the above example, the annual capital penalty for a source that must make total capital expenditures of $12 million to achieve compliance is approximately $0.5 million. Thus, a dollar-for-dollar credit provides no economic incentive for a source to spend any more than $0.5 million on capital expenditures in any year, or to achieve final compliance in less than 24 years. For these reasons, the Agency continues to believe that adopting a "dollar-for-dollar" credit approach would be unwarranted.

D. Interim Recalculation of the Penalty, Replacement Cycles. 1. *Interim Recalculation of the Penalty.*—EPA's proposed regulations provided that any error in computing a noncompliance penalty would be corrected upon the final adjustment after the source achieved final compliance. No provision was made for interim recalculations of the penalty.

Comments requested that EPA provide a mechanism for interim recalculations, pointing out that the initial calculation will often be based upon preliminary estimates of the expenditures necessary to achieve final compliance. Interim recalculations of the penalty would enable the source to pay quarterly penalties that more accurately reflected the costs avoided by noncompliance during that quarter. Interim recalculations, they argue, would also reduce the likelihood that the source would have to pay, or that EPA would have to refund, substantial amounts of money at the final adjustment stage.

Section 120(b)(8) of the Act does not require that the Administrator provide for an interim recalculation of the penalty, but merely authorizes him to do so. In most instances, the final adjustment mechanism under Section 120(b)(9) will be adequate to ensure that a source is not prejudiced by its over— or underpayment of the penalty prior to the time it achieves final compliance. EPA agrees, however, that in certain situations an interim recalculation of the penalty might be warranted. A source owner may petition for an interim recalculation of the penalty at any time. Such petition must contain the source's revised calculation, and a description of the changed conditions that necessitate the revision. The Administrator may also, on his own initiative, decide that an interim recalculation is appropriate. The decision to grant an interim recalculation of the penalty is within the sole discretion of the Administrator.

2. *Number of Replacement Cycles.*— In order to calculate the full economic benefits of noncompliance it is necessary to account not only for cash flows the source owner realizes in achieving compliance, but also those future cash flows that result from the delay. A source owner that delays installing pollution control equipment for two years receives an economic benefit which includes not only that two year period but also the benefit of being able to defer replacement of pollution control equipment, since such replacement will occur two years later than if the source owner had complied on time. This future savings has a present value equivalent, which the statute requires that EPA recover.

In order to capture these future savings, EPA's proposed model assumed an infinite number of replacement cycles. Comments argued that the use of infinite replacement cycles overestimates economic savings by assuming that an endless chain of similar pollution control devices will be installed on the underlying source of pollution. This, it is argued, is clearly not the case since obsolescence will set in, brought about in part by technological advances in pollution control equipment and by retirement or modification of the underlying source of pollution itself.

EPA agrees. Consequently, EPA has adopted a finite time horizon. The model limits the calculation of economic benefits to those occurring within 30 years of the date of the notice of noncompliance. A 30 year horizon recognizes that alternate investments are likely to be made in a variety of short-term and long-term investment opportunities, that the state of the art of pollution control technology and pollution control requirements are not likely to remain static for a period longer than 30 years, and that a 30 year period is commonly used by business planners contemplating a decision to make a long-term investment of capital. [This assumption is discussed in greater detail in the Technical Support Document.]

E. Payment of Penalty

The penalty will be paid quarterly, at the beginning of the quarter. The first payment will be due six months after the source receives a notice of noncompliance. If the source is challenging the finding of violation that led to issuance of the notice or petitioning for an exemption, the first payment will be due six months after the source has received a final administrative decision on its challenge or petition. The first payment will be in an amount equal to the costs avoided from the date of receipt of the notice through the period of the challenge, as well as the normal quarterly penalty for the upcoming quarter. In order to ensure that the full benefits of noncompliance are captured, EPA will include in the initial penalty amount due the benefit enjoyed by the source by delaying this initial payment. This will be calculated at the same discount rate used to make the initial penalty calculation. If the source owner fails to make timely payment of any penalty amount, Section 120(d)(5) of the Act requires that a twenty percent late payment penalty be added to the overdue penalty payment.

F. Final Adjustment

When a source believes it has come into compliance, it should notify the Administrator. The Administrator will

determine whether the source is in compliance based on documentation furnished by the source plus an independent verification where appropriate. If the Administrator determines that the source has achieved compliance, the Act requires that a final adjustment of the penalty be made within 180 days. Where an underpayment has occurred, the source must pay that deficiency within thirty days after the adjustment. Similarly, EPA or the State administering the program will reimburse a source for any overpayment that has occurred within 30 days after the final adjustment.

The Act requires that any reimbursement or additional penalty assessment be paid with interest. Interest payments are necessary to ensure that the penalty captures the economic value of noncompliance.[4]

The Act provides that the interest rate for over- and underpayments be specified by the U.S. Department of the Treasury. In correspondence with EPA, Treasury has indicated that the same rate of return on equity that is used to calculate the penalty will be used for underpayments. The interest rate for overpayments, however, will be equal to the average rate of interest on Treasury notes of a duration similar to, and over the period of covered noncompliance.

F. Limited Life Facilities. 1. *Shutdowns.*—EPA's proposed regulations discussed the way in which it would calculate penalties against a source owner that achieves compliance by shutting down its existing facility. The same approach has been adopted in the final regulations. Penalties will be calculated based upon the costs of retrofitting the existing facility with pollution control equipment. These costs form the proper basis for calculation, because it is the existing facility that is in violation of applicable legal requirements. The economic benefits enjoyed by the source arise from the continued operation of the existing facility without having installed the necessary pollution controls. These costs are avoided until the facility is shut down. Because the source owner does not make any precompliance expenditures, it will not be granted any credit against the initial penalty assessment.

2. *Credit for Replacement Facilities.* In some cases, a source owner might have elected to retrofit an existing facility rather than construct a replacement in order to obtain credits against the noncompliance penalty. To remove this disincentive to modernization by means of replacement, EPA will allow sources to reduce their penalty based upon expenditures made for construction of the replacement facility. This credit mechanism will make the source owner economically indifferent between achieving compliance by means of retrofitting the existing facility and constructing a replacement facility.

EPA will base the penalty calculation upon the costs of retrofitting the existing facility with necessary pollution control equipment. Comments argued that the penalty should be based upon the costs associated with installing pollution control equipment at the replacement facility. Replacement, they argue, represents the chosen means of compliance. Therefore, the costs being avoided by the source owner are those that should have been incurred to bring the replacement facility into compliance by the date on which a notice of noncompliance was received.

EPA disagrees. It is the existing facility that is in violation of applicable legal requirements. The economic benefits enjoyed by the source owner arise from the continued operation of the existing facility without having installed the necessary pollution controls. These costs are avoided until the existing facility is shut down.

Calculating penalties for replacement facilities necessitates a change in the method by which credits are granted, because the source owner will not actually retrofit the existing facility. The proposed regulations were inconsistent in identifying the appropriate expenditures on which credits will be based. The preamble based credits on expenditures made for pollution control equipment at the replacement facility. The Technical Support Document, however, provided that all expenditures made at the new facility, whether or not clearly related to pollution controls, would be considered in determining the appropriate credit amount.

EPA has decided to consider all expenditures made by the source towards constructing the entire replacement facility in determining the amount of the credit. Several factors favor this approach. First, the fact that credits are not absolute but proportionate to the total obligated expenditure means that there is little difference between basing the proportion on the total construction cost or limiting it to pollution control equipment. It is the rate at which those expenditures are made, not their magnitude that dictates their impact on the penalty. Whether a source spends in a given quarter $1 million of a $10 million total investment or $10 million of a $100 million total investment, its penalty would be reduced by 10%. Second, in constructing a replacement facility it will often be difficult to distinguish between expenditures for general process construction and expenditures directly related to pollution control. This would be particularly true if the replacement facility utilized an inherently less polluting process. Third, basing credits upon the entire replacement facility also minimizes the opportunity of the source owner to "frontload" the credit by purchasing pollution control equipment solely to reduce the capital component of the penalty long before actual operation of the replacement facility (or shutdown of the existing facility).

Credits in a replacement situation will be granted in a manner similar to non-replacement situations; i.e. if, in a given quarter, a source spends 10% of the capital costs associated with construction of the replacement facility, the inputs for calculating the capital component of the penalty for all succeeding quarters will be reduced by 10%. This method of calculating credits will be utilized whether the new facility is of greater or lower capacity than the one it replaces.

The proposed regulations provided that the penalties would be due until the source shut down the noncomplying facility and commenced operation of the replacement facility in compliance with all applicable standards. Comments received generally argued that the period of covered noncompliance should cease when the source shut down its existing facility since it would no longer be in violation. EPA agrees with these comments. Shutdown of a violating facility is an acceptable means of compliance. The source owner, however, will not be granted any credit against the penalty for expenditures on the replacement facility that occur after the date of the shutdown. Moreover, EPA possesses authority during the final adjustment to disallow expenditures

[4] For example, assume that a source paid eight quarterly penalties of $10,000 each (in constant dollars). The final adjustment, however, indicates that the actual quarterly penalties should have been $12,000, rather than $10,000, so that the original calculation underestimated the benefits of noncompliance by $16,000. Assessing a lump sum additional penalty of $16,000 ($2,000 per quarter x 8 quarters) would not recapture the full economic value that this delay in payment had to the source. Avoiding the payment of $2,000 for the first quarter of noncompliance allowed the source to invest that sum over the 8 quarters of noncompliance, plus that period of time until the final adjustment is completed. Similarly, avoiding payment of $2,000 for the second quarter of noncompliance allowed the source to invest that sum over seven quarters plus the period until final adjustment, etc. The statute requires that EPA recover or, in the case of an overpayment, refund this amount. The model automatically calculates the amount of interest owed as part of the final adjustment process.

claimed as credits if the time between shutdown of the old facility and start-up of the new facility is so great that the new facility is not really a replacement for the old one. In this case the penalty will be computed as if it were a simple shutdown situation with no replacement involved.

The proposed regulations specified the type of facility that EPA would consider a replacement facility. EPA proposed that the new facility must produce the same product or serve the same function, must be no more polluting per unit of production, and must be of substantially the same or greater capacity than the one being replaced.

As noted above, credits are allowed by the provisions of the Act. Regulatory objectives in allowing credits in this program are to promote air quality objectives without jeopardizing or diminishing the economic incentives to comply generated by the Act. Given that constraint, the credit policy has been designed to allow attainment of the Act's objectives without impeding modernization. It would be inconsistent with the Act's objectives to grant credits for all investment regardless of whether the new facility is truly a replacement facility for the noncomplying source which is being retired. Even if the source were retired, a credit for all new investment would be inconsistent with statutory objectives since in effect owners of violating sources, who simply wished to invest in alternative industries, would be subsidized and the economic advantage enjoyed by such owners would not in that event be removed but continued. Only where compliance is to be achieved by replacement of an existing facility is the continuum of investment such that a subsidy is consistent with the provisions of the Act, which allow credit to be granted to the extent that an expenditure is made toward compliance at existing facilities.

The criteria which EPA will use to evaluate whether a new facility replaces an older one are first, whether the old facility is retired, second, whether the product produced is the same or whether for some other reason operation of the replacement facility would eliminate the need for the product produced by the existing facility and third, whether their economic integration is substantially similar.

The requirement that the new facility or process serve a function similar to the one it replaces, is, in EPA's opinion, inherent in the concept of replacement. Thus a steel company could obtain credits to construct a new coke battery to replace an existing one. The company could also get credit for a process that eliminated the need for coke by making new steel from scrap since the new process serves a function similar to the process which it replaced.

A separate question is the location of the new facility; i.e., whether to qualify for credit as a replacement facility the new facility must be located at or near the site of the existing source. It would be artificially constrictive to require construction of a qualifying facility on the actual site of the facility replaced. Nonetheless, the proximity of the new facility to the existing one is a key consideration in determining whether the new facility is a true replacement for the old or merely a different facility in a different economic environment. EPA will consider therefore whether the new facility is physically and functionally integrated into the related production facilities and labor and sales markets of the old one. This evaluation will be made on a case-by-case basis.

EPA also has determined that it is not necessary to restrict credits to those replacement facilities that are less polluting per unit of production than the one replaced. Most new facilities will be less polluting, since they are required to satisfy applicable new source review requirements. There may be instances, however, in which the new facility could be more polluting per unit of production than the one it replaces and yet be in compliance with all applicable legal requirements. As long as these legal requirements are satisfied, and the new facility satisfies the other criteria discussed herein, EPA sees no reason to depart from a policy of allowing credits based upon the construction costs of the new facility.

IV. Exemptions

Subsections 120(a)(2) (B) and (C) of the Act set forth the circumstances in which sources may be exempted from the duty to pay a noncompliance penalty. A source owner wishing to request an exemption must do so within 45 days of receipt of a notice of noncompliance. Hearings on such requests will be on the record and will follow the procedures set out in the Agency's "Consolidated Rules of Practice" (40 CFR Part 22), except to the extent provided in Subpart J of these regulations. (The Consolidated Rules were proposed on August 4, 1978 (43 FR 34730), and promulgated on April 9, 1980 (45 FR 24360).)

One category of exemptions is based on the prior issuance of specified orders, extensions or suspensions. Included in this category are: (1) coal conversions pursuant to U.S. Department of Energy prohibition orders or State or EPA delayed compliance orders under Section 113(d)(5); (2) delayed compliance orders based on use of innovative technology under Section 113(d)(4); and (3) emergency implementation plan suspensions under Section 110 (f) and (g).

A second category of exemptions is available if the source owner is unable to comply for reasons that are entirely beyond his control.

A. Inability To Comply

1. *Compliance Schedule Precondition.*—The prerequisite for obtaining an inability to comply exemption under Section 120(a)(2)(B)(iv) is the source's possession of a delayed compliance order (DCO) issued pursuant to Section 113(d)(1) of the Act,[5] or an order issued pursuant to Section 113 as in effect prior to enactment of the 1977 Amendments and not voided by Section 113(d)(12). The statute is silent on the use of any other order or decree as a basis for exemption under Section 120(a)(2)(B)(iv). Since DCOs may not provide for final compliance beyond July 1, 1979, or three years beyond the date for final compliance specified in the SIP, whichever is later, the statute appears to limit eligibility for this exemption to those relatively few sources with SIP final compliance dates later than July 1, 1976, since these are the only sources eligible for DCO's.

In its March 21 proposal, EPA provided that a Federal or State court order or consent decree, if approved by EPA, could also provide a predicate for a petition for an exemption based upon inability to comply. EPA believes that allowing court orders and consent decrees (as well as DCOs) to serve as a predicate for an inability to comply petition is consistent with the Act and legislative history. Congress does not appear to have intended to preclude granting such exemptions to sources that are unable to obtain DCOs because their SIP compliance dates are earlier than July 1, 1976, so long as a true inability to comply is demonstrated. Rather, the purpose of requiring a DCO seems to have been to establish an expeditious schedule for compliance. An appropriate consent decree or court order satisfies this concern.

Comments received generally supported EPA's proposed approach. Comments, however, argued that EPA may not review the decision of a State

[5] Section 120(a)(2)(B)(iv) refers to orders under Section 113(d). EPA interprets the reference to Section 113(d) as a reference to Section 113(d)(1). Exemptions based upon orders issued pursuant to Sections 113(d)(5) [coal conversions] and (d)(4) [innovative technology] are covered by Section 120(a)(2)(B) (i) and (iii).

court to approve a consent decree or issue an order. Thus, it is argued that if the court determined that the source's inability to comply was for reasons entirely beyond its control, EPA may not deny an exemption.

EPA disagrees. Judicial discussion whether certain circumstances qualified a source for an exemption would only be advisory in the absence of EPA action. Moreover, the statute links eligibility for an exemption to possession of a DCO. DCOs require EPA approval, and parity requires that orders or consent decrees also be examined, not to determine whether they are valid, but to determine whether they form a predicate for exemption. In order to serve as a predicate, the order or decree must satisfy certain conditions of Section 113(d) of the Act. It must contain, among other things, an expeditious compliance schedule, require compliance with interim requirements, and provide for emission monitoring and reporting. EPA will not enter into or approve consent decrees unless they satisfy these criteria. Finally, all orders would have to be final; that is, a source could not seek an exemption from the noncompliance penalty on the basis of an unconsented judicial order or decree if it was appealing that order or decree.

2. *Scope of the Inability to Comply Exemption.*—The second test established by Congress for inability to comply exemptions is that such inability must be for reasons that are entirely beyond the control of the source. It is for the Administrator to determine whether, for purposes of Section 120, the circumstances are such that the source's noncompliance was due to reasons entirely beyond its control. This assures consistency and provides a uniform basis for Federal court review. (If the State is granted delegation of the noncompliance penalty program, EPA is authorized to review any exemption granted by the State).

EPA's proposed regulations limited the inability to comply exemption to the five factors listed in the 1977 House Committee Report: fires, strikes, embargoes, natural disasters, and the complete impossibility of a supplier or contractor to furnish the goods or services necessary to achieve compliance.[6] EPA requested comment on whether technological or economic impossibility should also be considered to be entirely beyond the control of the source.

Commenters argued that any attempt by EPA to limit the factors that constitute inability to comply would contravene the legislative history. These commenters point out that the House Committee rejected Administrator Costle's request that the exemption be limited to easily verifiable factors such as fires or strikes. The Committee noted that "some flexibility" was required since "not all possible unforeseen circumstances could be foreseen and expressly provided for".[7] These comments argued that a source must be permitted to demonstrate in an adjudicatory hearing that any set of circumstances rendered it unable to comply for reasons entirely beyond its control.

EPA disagrees. Congress' unwillingness to specify in the statute circumstances constituting inability to comply does not mean, in EPA's view, that it should make no effort to establish such circumstances in the regulations. Far from indicating that a general exemption should be provided, Congress indicated that the inability to comply exemption "should be construed narrowly, so as not to open a loophole or defeat the purposes" of the penalty program.[8] Providing for a general exemption could result in erroneous or inconsistent determinations of what constituted inability to comply, thereby frustrating Congress' intent. Few comments suggested that EPA's list was deficient in omitting any particular situation.

The final regulations respond to Congress' concern that some limited flexibility be afforded by substituting the term "Act of God" for the term "natural disasters." The latter connotes events that are not necessarily (though usually) unforeseeable and which affect large numbers of people. The term "Act of God" connotes a genuinely unforeseeable event, whether or not large numbers of people are affected. Moreover, EPA possesses authority to expand in the future the list of situations that constitute inability to comply should this become necessary to prevent inequity in a particular case.

In addition to providing a general exemption for inability to comply, commenters encouraged EPA to include technological and economic impossibility as being entirely beyond the control of the source. Commenters also argued that relief should be granted for sources that made "good faith" efforts at compliance. EPA's resolution of these issues is discussed below.

B. Additional Situations Constituting Inability To Comply. 1. *Technological Impossibility.*—Claims of technological impossibility will not provide a basis for an inability to comply exemption. Comments suggested that some SIP requirements are technologically impossible to achieve, and that source owners subject to such requirements should be exempted. EPA disagrees. As noted in the preamble to the proposed regulations, the legislative history indicates that sources should not be totally exempt from penalties by reason of technological impossibility. The House Committee on Interstate and Foreign Commerce indicated that the absence of any adequately demonstrated pollution control equipment would constitute grounds for an exemption from the noncompliance penalty only if the source "had made maximum feasible efforts to research and develop the necessary technology or to assist some other persons to do so."[9] Senator Muskie, however, in discussing the Conference Report accompanying the 1977 amendments, emphasized that claims that technology is not available to meet a certain emission standard would not exempt a source from the penalty.[10]

While the House and Senate differed somewhat in their approaches to this problem, it is clear that neither House contemplated the granting of an outright exemption. This position is consistent with the technology-forcing philosophy of the Act, as recognized by the Supreme Court (*See, e.g., Union Electric Co.* v. *EPA*, 427 U.S. 246 (1976)).

Where existing technology has not yet demonstrated compliance, the penalty will be based upon the cost of installing the best available controls as determined on a case-by-case basis, as well as a commitment to an appropriate research and development (R&D) program designed to develop the new means of emission control necessary to achieve the standards. Thus, a source that has taken and is continuing to take all possible steps to achieve compliance, including the installation of the best available controls and, where appropriate, participation in an appropriate R&D program, would be considered to be deriving no economic benefit from its failure to comply; i.e. any penalty calculated would equal zero. (Appropriate R&D projects will be determined by the Regional Offices or by the Office of Research and Development.)

Calculating noncompliance penalties on the basis of best available controls should encourage sources to undertake vigorous control efforts. Providing for an

[6] H.R. Rep. No. 95–294 95th Cong., 1st Sess. 76 (1977). [House Report]

[7] *Id.*

[8] *Id.*

[9] House Report at 76, FN.

[10] 123 Cong. Rec. S. 13698–99 (daily ed. Aug. 4, 1977) (remarks of Sens. Muskie and Stafford).

outright exemption on the other hand might encourage a source subject to stringent requirements to delay installing controls and/or to challenge the control requirements in the hopes that they might be found to be impossible to achieve. Basing the penalty calculation on the cost difference between installation of best available controls and those actually installed eliminates the economic advantage experienced by sources subject to impossible requirements that have made no (or minimal) compliance efforts and those that have installed the best available controls. Providing for a complete exemption, on the other hand, would allow for no distinction among sources that made vastly different compliance efforts. This result would frustrate the intent of the Act.

2. *Inability To Pay.*—The preamble to the proposed regulations discussed the possibility that, in certain instances, a source that was unable to obtain financing for pollution control equipment could be exempted from the penalty. To qualify for this exemption, the source would have to demonstrate that its inability to obtain capital resulted from temporary, verifiable, general market conditions. Merely being a poor loan risk would not entitle the source to an exemption. Finally, EPA provided that in no event could an exemption be granted if capital was available to the source owner or operator for the purpose of improvement or expansion of the existing production capacity, or for construction of new production capacity.

Commenters argued that the test for economic impossibility should focus not on conditions in capital markets, but on the financial condition of the individual source.

EPA disagrees. There is no indication that Congress meant to exempt sources that were experiencing economic difficulties except where those difficulties are due to temporary, verifiable market conditions. As noted in the proposal, the test established by the House Committee in an earlier version of the noncompliance penalty provision focused on conditions in the capital markets, rather than on the source's individual financial position.[11] The Senate Committee's approach was even more restrictive, providing that cost of control should not form the basis for an inability to comply exemption.[12]

It is also clear financially troubled facilities that delay compliance realize an economic benefit. Compliance with the requirements of the Clean Air Act is a cost of doing business. By avoiding these costs, the source may pursue other investments. The fact that the source may have operated at a deficit does not alter this; the effect of noncompliance in this case is to reduce the level of deficit.

The source also may have gained some level of competitive advantage over others that have made the expenditures necessary to achieve compliance.

In issuing notices of noncompliance, however, EPA will consider whether a source is economically able to both pay the penalty and comply with applicable emission limitations without shutting down. EPA does not intend to implement this program in a way that will force the closure of sources that are moving toward compliance.

3. *Best Engineering Judgment.*—Comments argued that noncompliance penalties should not be assessed against sources that have made good faith efforts at compliance. These commenters noted that the economic model does not specifically provide a credit for unsuccessful compliance efforts. Because the penalty is calculated upon the control method that will achieve compliance, a source that made substantial efforts at compliance could be assessed the same penalty as an identical source that had done nothing towards reducing its emissions.[13]

EPA believes that "good faith" is too amorphous a test on which to base an exemption. A more objective test would focus on the reasonableness of the compliance method chosen and whether or not the failure of that method was foreseeable. Therefore, the regulations provide that a source that has obtained the requisite order or decree shall be exempted if it either failed to achieve full compliance or failed to meet compliance deadlines, provided that EPA finds that best engineering judgment and due diligence were used throughout the entire compliance plan and that the source's violation was due to unforeseeable technical problems.

This exemption is justified to avoid inequity where sources have failed despite best efforts to achieve compliance through installation of pollution control equipment or other measures and where the failure of the control method to achieve compliance could not have been foreseen in time to correct the situation. The source might actually have incurred costs equal to or greater than would have been incurred in installing controls that are now known to be superior to the source's initial choice. In this case, the source would not have derived an economic benefit from its failure to comply. Assessment of a noncompliance penalty could actually place the source at a competitive disadvantage against a source that had done nothing, since both ultimately must install necessary controls.

C. Period of the Exemption. In order to petition for an exemption, the source owner must have been granted one of the orders, suspensions or extensions specified in the Act. Issuance of certain orders requires a demonstration that a particular event has already occurred. Comments argued that the effective date of certain exemptions should be the date of the underlying order or the date of the occurrence for which the order was issued, rather than the date on which the exemption was granted.

EPA agrees that the effective date for certain exemptions should relate back to the date of the underlying order. Where an order covers a source that is converting to coal as its primary energy source (§ 120(a)(2)(B)(i)), is prohibited from converting from the use of coal to petroleum products or natural gas (§ 120(a)(2)(B)(ii)), is utilizing innovative control technology (§ 120(a)(2)(B)(iii)), or is granted an EPA-approved suspension under Section 110(g) (§ 120(a)(2)(B)(v)), the underlying order sanctions conduct that will occur in the future. For this reason, the period of any exemption granted will begin on the date of issuance of the underlying order and terminate on the date for final compliance specified in the order.

In other cases, the exemption will relate back to the event that necessitated the order. Exemptions for inability to comply for reasons entirely beyond the source's control (§ 120(a)(2)(B)(iv)), or energy emergencies pursuant to Section 110(f) (§ 120(a)(2)(B)(v)) are in this category.

An exemption for inability to comply should last no longer than the event which necessitates the exemption, or the delay directly attributable to the event. Such an event, e.g., a fire, may occur at any source, including one that was in compliance. If the source had been in compliance, the entire period of ensuing noncompliance could be exempt (assuming the source complied with the terms of the schedule contained in the underlying order). If the source had undertaken compliance efforts but had not yet achieved compliance, any

[11] H.R. Rep. No. 94-1175 94th Cong., 2d Sess. 42 (1976).

[12] S. Rep. No. 95-127 95th Cong., 1st Sess. 50 (1977) [Senate Report].

[13] The comments, and this discussion assume that the method chosen would have to be scrapped and a completely different system installed. On the other hand, a source that merely had to add on additional equipment to achieve compliance would only be assessed a penalty based on the costs of the add-on equipment.

exemption would expire (notwithstanding the expiration date of the underlying order) when the source had reconstructed its pollution control equipment to the same level that had existed at the time of the fire.

There may also be situations in which only a portion of the source's inability to comply was due to reasons entirely beyond its control. In such situations, EPA could reduce the amount of the penalty assessed to take account of this partial inability.

Exemptions granted pursuant to suspensions under Section 110(f) may also pre-date the underlying suspension. This section authorizes the Governor, upon application of a source owner and after a public hearing, to petition the President to determine that an energy emergency exists that justifies a temporary suspension of certain SIP provisions. In the case of an emergency situation, the source owner might not be able to purchase conforming fuels even before it actually receives a suspension from the Governor following a Presidential declaration. EPA believes that if the source can demonstrate that it was completely unable to purchase necessary fuels, it could be granted an exemption as of the date of this inability, rather than from the date the SIP was suspended. In no case, however, could an exemption be granted if the President did not declare an energy emergency and the Governor not suspend the SIP applicable to the source.

De Minimis Exemptions

Section 120(a)(2)(C) exempts a "particular instance of noncompliance" if the Administrator determines, after notice and opportunity for a public hearing, that the noncompliance is *de minimis* in nature and duration. The term "in nature and duration" is not discussed in the legislative history. EPA proposed several criteria for evaluating whether a particular violation is *de minimis*. Those criteria included the magnitude of the noncompliance, whether such noncompliance is of a recurring nature, the steps being taken to minimize such excess emissions, and the extent to which the source has benefitted economically from its noncompliance.

EPA received many comments on this proposal. Most of the comments argued that the only relevant factors for EPA to consider in determining whether a violation is *de minimis* are the level and duration of the excess emissions. Other commenters argued that EPA should consider the impact of a particular violation on ambient air quality.

EPA believes that the proposed criteria are reasonable and necessary for effective regulation. The criteria proposed by EPA were designed to deter violations that could have been avoided without imposing unwarranted burdens on both EPA and the source. The nature and amounts of the pollutant involved and the duration of a particular instance of noncompliance are the leading criteria, but they need not be the only ones considered in determining eligibility for an exemption. Consideration of these other enumerated factors will allow EPA to determine whether issuance of a notice of noncompliance is warranted in any given case. For example, a source experiencing persistent minor violations might be able to eliminate them by installing control equipment or by improving O&M practices. In this case, granting a series of exemptions might not be appropriate, notwithstanding that each violation, viewed separately, would be *de minimis* in nature and duration and would have an insignificant effect on air quality. The assessment of a noncompliance penalty in such situations would act as an incentive for the source to take whatever steps were necessary to avoid the periodic violations. Further, such sources are in fact enjoying an economic benefit due to their failure to install necessary controls or utilize proper O&M procedures.

If, on the other hand, the source is doing everything possible to avoid its excess emissions, or if there is no piece of control equipment or O&M practice that would completely eliminate the violation, there would be little or no calculable economic benefit from noncompliance. In this case, the assessment of a penalty, assuming one could be quantified, would not be an effective deterrent to future intermittent violations. Thus, the costs to the source and EPA of imposing a penalty would outweigh any benefits.

Malfunctions

The Agency's proposed exemption for *de minimis* violations included sudden and unavoidable breakdowns of process or air pollution control equipment. This exemption will be based on, among other things, a finding that the source's pollution control equipment was properly designed, operated and maintained, that the amount and duration of the excess emissions were minimized, and that the source had not gained a significant economic advantage from the breakdown.

Comments supported EPA's proposal to exempt true malfunctions from the penalty. It was suggested at the same time that such noncompliance might be viewed, and exempted, as being for reasons entirely beyond the source's control. One reason suggested in favor of such an approach was that malfunctions may result in excess emissions of considerable duration and amounts.

Treating malfunctions wherever possible within the *de minimis* exemption is reasonable. Adjudicatory hearings are not required to determine eligibility for a *de minimis* exemption, and a more expeditious and informal notice and comment procedure can be used. Treating malfunctions within the *de minimis* procedure also avoids the necessity of obtaining a consent decree or DCO as would be the case under an inability to comply exemption. There may be situations, however, in which the nature or duration of the violation would not be *de minimis*. In such cases, the source would be subject to the penalty, unless it qualified for an exemption for inability to comply for reasons entirely beyond its control.

Eligibility for an exemption will be determined on a case by case basis. The source owner will have to demonstrate that the pollution control equipment was operated and maintained properly at all times. The owner must also demonstrate that he received no significant economic benefit from his noncompliance. Any activity that can be foreseen and planned for will not constitute a malfunction. This includes in most instances the phasing in and phasing out of equipment and routine maintenance operations.

One issue raised by several commenters concerned the effect of SIP malfunction provisions. Several SIPs which have been approved by EPA contain provisions that do not treat equipment malfunctions as violations, provided that the source satisfies certain criteria specified in the SIP. Commenters argued that a source that satisfies a SIP malfunction provision would not be in violation of the SIP and that assessment of penalties would be improper, regardless of the level of excess emissions.

EPA has recognized that some SIP malfunction provisions might not be consistent with the requirements of the Clean Air Act and with the Agency's malfunction policy. On April 27, 1977, EPA gave notice that it would review SIP malfunction provisions and, if necessary, disapprove them (42 *Fed. Reg.* 21472). If source is in compliance with an EPA-approved malfunction provision, then noncompliance penalties will not be assessed. EPA, however, may make an independent assessment

of whether the excess emissions constitute a malfunction under the SIP.

Federal, State, and Municipal facilities

The final regulations are applicable to federal, State, and municipal facilities. In the preamble to the proposed regulations, EPA stated its conclusion that Congress intended that noncompliance penalties apply to such government entities. Comments argued that a penalty should not be assessed because it is the citizen, not the government-owned facility, that benefits from noncompliance. Federal commenters argued that Section 120 provides no real incentive to achieve compliance because the federal government both pays and collects the penalties.

EPA finds no legal basis for exempting government owned facilities. Congress was aware of the special considerations that might apply to government-owned facilities. The statute covers them, and there is no indication in the legislative history that Congress intended to exempt them. Section 118 subjects the federal government to all federal, State and local air pollution control requirements, as well as any applicable process or sanction to the same extent as any non-governmental entity. The applicability of the Clean Air Act to States and municipalities is also well established.

Furthermore, the purpose of Section 120 is to recapture the costs that a source avoids by not complying with the law. A noncomplying government-owned facility avoids these costs in much the same way that a privately owned source does. Thus, unless they qualify for one of the specified exemptions, government-owned facilities will be assessed noncompliance penalties.

Electric Utilities

Section 120 (d)(2)(A) provides that the amount of the penalty shall be equal to the economic value that a delay in compliance has to the source owner. Comments argued that regulated utilities should be exempted from Section 120, or be separately treated, on the ground that the nature of regulation is such that the beneficiaries of a utility's failure to comply are its ratepayers, not the utility or its shareholders. Charges for utility service are set by public utility commissions at a level estimated to be sufficient to recover operating costs and earn a fair return on the capital invested in the equipment used to provide electric service. Pollution control equipment constitutes invested capital of this kind. Assuming that the rate setting process works properly, it is argued the cost of pollution control devices is passed through to the ratepayers making them, not the utility, the economic beneficiaries of delayed compliance. In the alternative, utilities argued that if EPA assesses penalties, it should modify the economic model to reduce the penalty by the amount of cost savings passed through to the ratepayers.

EPA disagrees. There is no statutory basis for exempting electric utilities. The legislative history indicates that Congress did not intend that regulated utilities be exempted from the penalty. The Senate Report assumed that noncomplying electric utilities would be covered.[14] Additionally, an effort was made to grant exemption to the Louisville Gas and Electric Company because of its continued efforts to develop scrubbing technology.[15] This effort would not have been necessary if utilities in general were to be exempted from penalties.

There is also no legal or economic basis for according special treatment to utilities because they are regulated. The purpose of Section 120 is to establish a penalty that makes the source owner or operator, i.e., the decision maker, indifferent, from an economic viewpoint, between on-time compliance compared to delayed compliance with payment of the penalty. To achieve this indifference, the penalty must remove the incentives to delay compliance—the opportunities for alternative investments and improved market position. These incentives do not disappear, either in the case of regulated or non-regulated industries, simply because some of the benefit of avoidance of obligatory costs is passed through rather than retained. All industries, whether or not regulated, may, in theory, pass through costs or, conversely, the benefit of cost avoidance. (The benefit in both cases may simply change from a quantifiable dollar benefit to the somewhat more intangible benefit of improved market position). The fact that the mechanism is a price in some cases and a rate in others is immaterial. Congress noted explicitly that noncomplying utilities, to the extent they can lower their rates, can attract new customers.[16] Congress significantly did not provide for *any* industry that penalties be reduced to the extent benefits were passed through. The fact that the benefits of improved market position were to be recouped indicates, in fact, the opposite intention. The Congressional plan to equalize the market position of those who complied and those who delayed complying would be frustrated by a method of computation that in effect ignores Congress' focus on the central role and operative significance of the decisionmaker.

The specificity of the statute in defining the costs that EPA is to consider in determining the economic value of noncompliance further evidences this intent. The penalty (economic value of noncompliance) must equal the capital costs of compliance and debt service over a normal amortization period, not to exceed ten years, operation and maintenance costs foregone, and any additional economic value of delay. Similarly, the statute limits credits to expenditures made by the source to come into compliance. This specificity regarding the calculation of credits indicates that Congress did not intend that revenues from ratepayers lost by failure to comply on time were to be subtracted in computing the penalty.

V. Administrative and Judicial Review

A. Adjudicatory Hearings. EPA's proposed noncompliance penalty regulations provided that a source has 45 days to petition for an adjudicatory hearing to challenge the finding of violation that led to issuance of a notice of noncompliance, petition for an exemption, or challenge a recalculation of the penalty. A hearing would be granted if the source presented information which if true would alter the liability of the source.

Commenters argued that EPA lacked authority to deny a request for an adjudicatory hearing in view of the language of Section 120(b)(5), which states that the EPA's implementing regulations "shall require the Administrator to provide a hearing on the record" whenever the source submits a petition.

EPA disagrees. Despite the seemingly non-discretionary language of the statute, an administrative agency may deny a formal hearing if it clearly appears from the data submitted in the petition that the source has not raised any significant questions of material fact. *See, e.g., Weinberger v. Hynson, Westcott and Dunning, Inc.*, 412 U.S. 609 (1973); *Federal Power Comm. v. Texaco, Inc.*, 377 U.S. 33 (1964). Furthermore, the granting of a hearing is not necessary to protect the due process rights of the source. The regulations provide that any denial of a hearing constitutes final agency action and may be reviewed by the court. This right of judicial review ensures that the source will not be

[14] Senate Report at 49.

[15] *See*, 123 Cong. Rec. S. 9435 (daily ed. June 10, 1977) (remarks of Sens. Huddleston and Muskie). *See also* H. 8664, 8669 (remarks of Congressman Waxman) (daily ed. Aug. 4, 1977).

[16] Senate Report at 49.

prejudiced by the Agency's decision to deny a hearing.

Other commenters argued that the 45 day time period provided for response to notices of noncompliance was too short. These commenters argued that EPA should either extend the 45 day period, or allow the source to amend its petition.

The 45 day time limit for the submittal of petitions is established by the statute. EPA will allow, however, a source to amend its petition within the 45 day period. Leave to amend after the 45 day period may be granted if the source demonstrates that changed conditions occurring after the 45 day period make amendment of the original petition necessary. EPA believes that these procedures provide the source with adequate opportunity to submit an acceptable petition. The petition itself need not be an elaborate legal brief. It need only set forth clearly the grounds on which the source believes it is entitled to relief.

Another issue raised concerned the amount of time provided for adjudicatory hearings. Commenters noted that, read literally, the Act requires that the Administrator reach a final decision within 90 days of the date the source requests a hearing. The proposed regulations, however, provided for an initial decision by an Administrative Law Judge (ALJ) within 90 days of the date of the granting of the hearing. Some commenters argued that the Act's literal requirements should be followed. Other commenters argued that due process requires that the source be allowed to raise for consideration every legitimate issue and that this right must take precedence over any arbitrary time limit.

It is clear that Congress intended that the necessary adjudicatory hearings be conducted quickly to minimize the source's uncertainty of its liability for the penalty. However, it is also clear that any hearing must comport with requirements of due process. The Agency believes that the requirement that the Administrator reach a final decision within 90 days of the time the hearing is requested might not be adequate in some instances to ensure these due process rights. For this reason the final regulations provide that the ALJ shall issue an initial decision within 90 days after the hearing is granted. The regulations also provide that this 90 day period may be extended by agreement of the parties.

EPA will attempt to carry out these hearings within the specified time periods. Failure to do so in an individual hearing, however, will not lead to dismissal of the action or affect the accrual of penalties. Such an automatic dismissal would give sources an incentive to delay the proceedings. In order to avoid prejudice to the source, however, the regulations provide that no penalty payment will be due until 180 days after the source receives a final administrative decision on its petition. Thus, no source will be forced to pay a penalty amount it is disputing while challenges to resolve that dispute are underway.

B. Limitation of Issues for Hearings. Section 307(b)(1) of the Act provides that rules of national scope issued by the Administrator are reviewable on petition to the United States Court of Appeals for the District of Columbia filed within 60 days of their promulgation. Section 307(b)(2) provides that administrative action that could have been reviewed "shall not be subject to judicial review" in enforcement proceedings.

These judicial review provisions evidence Congress' belief that the public interest is best served by an early and consistent disposition of legal challenges to the provisions of regulations issued under the Clean Air Act. That intent would be nullified if EPA were to allow challenges to its regulations in proceedings under Section 120. To carry out Congress' purpose in this respect, EPA's final regulations define the issues that may and may not be raised in individual adjudicatory hearings.

Comments argued that EPA may not restrict the issues which may be raised in an adjudicatory hearing. EPA disagrees. The issues excluded from adjudicatory hearings are the kind of issues Congress intended for early, consistent resolution. The purpose of Section 307 of the Act is to promote consistent interpretations of the law by centralizing judicial review. Allowing sources to raise these issues in the context of an adjudicatory hearing would violate the provisions of Section 307, increase the likelihood of inconsistent determinations, complicate the hearings, and make it difficult to render initial decisions within 90 days.

C. Additional Adjudicatory Hearings. EPA's proposed regulations limited the instances in which a source could be granted an adjudicatory hearing. A source could seek a hearing to challenge the finding that it was in violation of applicable legal requirements, that it was entitled to an exemption, or that EPA's calculation of the penalty was erroneous. Commenters suggested several additional situations in which EPA should provide for adjudicatory hearings.

The final regulations expand the list of situations for which a hearing may be granted to include a finding that a source has not achieved final compliance, and a decision to revoke an exemption. Another issue suggested in the comments as requiring a hearing would be EPA's determination that a source was a "major source", or whether the person issued the notice is an "owner or operator" of the stationary source and thus subject to Section 120. EPA believes that the source's ability to raise these issues is implicit in any hearing on the finding of violation and that a special hearing category for these issues is unnecessary.

The regulations also limit decisions that constitute final Agency action to those listed in the regulations. Judicial review is available on all of these issues provided that the source exhausts all of its administrative remedies. To exhaust administrative remedies the source must request an administrative hearing and must appeal or attempt to appeal any unfavorable decision to the Administrator.

D. Informal Hearings. Section 120(a)(2)(C) of the Act provides for informal hearings to determine whether a source should be exempted because its noncompliance is *de minimis*. Such hearings need not meet the requirements of the Consolidated Rules. A source applying for a *de minimis* exemption must submit all relevant information. The hearing shall be scheduled upon notice to the public. Opportunity for submission of questions by the public to the petitioner shall be afforded, but the hearing officer may exercise his discretion to limit the number of questions allowed. The decision of the hearing officer will be made in writing within a reasonable period of time after the close of the hearing.

Where a State has been delegated the noncompliance penalty program, its hearings on challenges to notices and exemption requests may be informal so long as the conditions established in Section 67.11 of the Regulations are met. Where a State hearing is held, any EPA hearing to review State exemption decisions or penalty assessments may be of an informal nature.

E. Confidentiality. Comments received expressed concern that EPA take adequate precautions to ensure the confidentiality of any business information submitted by the source in the context of a penalty assessment. EPA recognizes the need to protect the confidentiality of business information. The procedures that EPA will follow in handling confidential information are codified at 40 CFR 2.201 *et seq.* These procedures require that the source

specify the materials that it believes are entitled to confidential treatment.

VI. State Involvement

A. Delegation. Part 67 deals with State involvement in assessing and collecting noncompliance penalties. EPA encourages all States that are interested in the program to seek delegation as soon as possible. Penalties assessed by a State will be paid to that State.

In order to be delegated the authority to administer this program, a State must request a delegation by describing its proposed program. The request must indicate, among other things, the availability of adequate staff and funds and the capability for conducting the necessary financial analysis and administrative hearings, as well as an indication that the State possesses adequate legal authority to carry out the program. Where specific assistance from EPA will be necessary, the State request should so indicate.

After a State delegation is in effect, EPA will retain concurrent authority to assess and collect a penalty against any source within that State that is subject to the penalty and against which the State has failed to take appropriate action. The Act requires that EPA review a State's administration of the noncompliance penalty program to ensure that it conforms to the requirements of the Act and EPA's regulations. To enable such review, the proposed regulations specified extensive reporting requirements for States to follow. Comments received objected to these proposed requirements as unnecessarily stringent, and urged that they be reduced.

The final regulations reduce the mandatory reporting requirements to the greatest extent possible. The regulations require the State to provide a copy of each penalty calculation which it performed or approved, together with any information needed to verify its accuracy. This information is required by the Act itself. Additionally, upon request by the Administrator, the State must furnish a copy of the record compiled in any administrative hearing which it conducted. Transmittal of this information is necessary to enable EPA to fulfill its non-discretionary duty under Section 120(b)(6) to review, upon request by the source owner or operator, the State's decision in any administrative hearing.

Additional reporting procedures, if any, which may be needed to ensure adequate EPA oversight of the State's program will be specified in the individual delegation of authority. This procedure will enable EPA and the State to structure any necessary reporting mechanism in a manner that is most convenient for the State. EPA oversight of State penalty programs will diminish as the State demonstrates continued implementation of the program in accordance with the requirements of the law.

Where the Administrator determines that a source has been overlooked, or that other steps subsequent to the issuance of a notice of noncompliance have not been taken, he will notify the State that EPA will issue a notice of noncompliance or take other appropriate measures if the State does not cure the defects in its proceedings within 30 days. The penalty will be calculated from the date the source first received a notice of noncompliance from either the State or EPA.

Provision is also made in the regulations for review of State exemption decisions and penalty assessments. Where the Administrator disapproves a State action, EPA will then take whatever steps are necessary to assess the penalty against that source in accordance with these regulations. If the Administrator determines that the State has generally failed to administer the program as required in the regulations, he shall so notify the State, setting forth the reasons for such a determination. The State may then respond. If the State cannot so demonstrate conformity with the regulations, the Administrator will withdraw the delegation and implement the program.

Final Action

The following regulations and the appendices thereto are nationally applicable, and this action is based upon a determination of nationwide scope and effect. Therefore, under Section 307(b) (1) of the Act, judicial review may be sought only in the United States Court of Appeals for the District of Columbia Circuit. Petitions for judicial review must be filed on or before [insert date 60 days after publication date]. Under Section 307(b)(2) of the Clean Air Act, the requirements which are the subject of this Notice may *not* be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.

(Sections 120, 301 and 114 of the Clean Air Act, as amended, 42 U.S.C. 7420, 7601 and 7414)

Douglas M. Costle,

Administrator.

July 7, 1980.

Responses to Comments

Note.—Responses to Comments will not be printed in CFR.

I. General

1. (a) Monitored violations that fall within the range of error in monitoring equipment should not constitute noncompliance.

Response: The SIP regulation applicable to a particular source defines what constitutes noncompliance, and specifies the testing method by which compliance will be determined. There is no basis in the Act or legislative history for requiring that EPA consider the range of error in monitoring equipment before determining that a violation exists, unless the SIP itself so specifies. Any violation of the SIP requirements as approved by EPA subjects the source to noncompliance penalties.

(b) Does the noncompliance penalty apply to violations of reporting requirements or increments of progress?

Response: The statute provides that all violations that result in an ecomomic benefit to the source are subject to noncompliance penalties. This could include violations of reporting requirements or increments of progress.

2. Sources should not be assessed noncompliance penalties where SIPs:

(a) are subject to a revision and the federal government has not acted on the revision within a reasonable time.

(b) are about to be changed and, as changed, the source would no longer be in violation.

Response (a) and (b): A source is subject to the provisions of a SIP. SIP revisions are effective only after approval by EPA. The pendency of a SIP revision does not excuse the source from complying with the existing SIP, or insulate the source from noncompliance penalties.

(c) have been stayed by a State court.

Response: As noted in the preamble, EPA is determining the effect of State court stays in light of the recent opinion in *Illinois* v. *Commonwealth Edison Company,* and will announce its policy on this as soon as this analysis is completed.

3. If a source decides to shut down upon issuance of a notice of noncompliance, the source should not be liable for the penalty.

Response: A source that complies by permanently ceasing operation is no longer in violation of the law and will not be assessed a penalty for the period of time after its shutdown. The source has, however, enjoyed the benefit of noncompliance up to the time of shutdown, and a penalty is appropriate. The preamble discusses how credits will be granted when a source owner or operator complies by replacing an older facility.

4. Some sources operate only intermittently. Will the penalty be limited to periods during which the source is actually operating?

Response: EPA will calculate noncompliance penalties for the entire period from receipt of a notice of noncompliance until the source actually achieves final compliance. By failing to make necessary expenditures to install pollution controls, the source achieves an economic benefit. This benefit is enjoyed until these expenditures are made, whether the source operates for the full 12 months or some lesser period. There may, of course, be a reduction in the amount of O&M penalty reflecting the source's intermittent operation.

5. The penalty should not be assessed against nonferrous smelters until Nonferrous Smelter Order regulations are promulgated.

Response: EPA will not assess penalties against smelters for violations of sulfur dioxide requirements prior to promulgation of the nonferrous smelter order regulations. Further, smelters will be allowed adequate time in accordance with the statute and the regulations to apply for and receive a § 119 order prior to imposition of § 120 penalties. Violations of requirements relating to other pollutants will not be affected by these smelter regulations.

6. The definition of "applicable legal requirements" should include variances, and a source operating in accordance with the provisions of a variance should not be subject to the penalty.

Response: The term "variance" is loosely used to describe a variety of procedures which have differing legal effects. As used by EPA, the term "variance" refers to an EPA-approved SIP revision under Section 110 of the Act. To be approvable by EPA, the revision must be such that it would not prevent the attainment and maintenance of the national ambient air quality standards. Upon approval by EPA, such a revision amends the SIP, and compliance with its provisions constitutes compliance with the SIP. Other "variances" do not satisfy these criteria and do not constitute an "applicable legal requirement" of a SIP.

7. Penalties should only be imposed on sources that are not installing pollution controls as rapidly as possible.

Response: EPA disagrees. Even a source that is installing controls as rapidly as possible is benefitting from its failure to achieve compliance with the requirements of the law as of the date of receipt of a notice of non-compliance.

8. Information required under the model could give an advantage to competitors.

Response: A source may seek confidential treatment for information provided pursuant to statute under the provisions of 40 CFR Part 2.

II. Exemptions

1. Prehearing conferences concerning petitions for exemptions should be provided so that issues can be resolved without a hearing.

Response: EPA encourages prehearing conferences. As noted in the regulations, EPA will generally follow its Consolidated Rules of Practice for adjudicatory hearings. These Consolidated Rules provide explicitly for prehearing conferences.

2. A source obtaining a delayed compliance order in connection with a revised SIP requirement should be automatically exempted under Section 120.

Response: Section 120 is designed to recapture the economic benefit enjoyed by a source that does not achieve timely compliance with SIP requirements. Sources obtaining DCOs enjoy an economic benefit by not having achieved such timely compliance. While insulated from a civil enforcement action under Section 113 or citizen's suits under Section 304 during that period, there is no reason such sources should also enjoy the economic benefit of delay unless they qualify for an exemption under Section 120. The fact that the DCO relates to a revised rather than an existing SIP requirement does not, in and of itself, provide a basis for giving it special treatment. Section 120 also specifies the circumstances under which a DCO exempts a source from noncompliance penalties.

3. A consent decree should exempt a source as an inability to comply.

Response: EPA disagrees. The existence of a consent decree is the result, not the cause of, the source's failure to comply on time. It is an enforcement response to the fact that the source is in violation. The standard for obtaining a consent decree is that the source is unable to comply immediately. The standard for receiving an exemption is more stringent, i.e., that the inability resulted from reasons entirely beyond the control of the source. Sources on consent decrees do obtain an economic benefit from their delayed compliance. The noncompliance penalty recovers this benefit.

4. A source owner should not be required to possess a final court order or consent decree in order to petition for an exemption based on inability to comply for reasons entirely beyond the source's control.

Response: EPA disagrees. Until a court order or decree is final EPA cannot determine whether it may serve as a predicate to the exemption. Where the event giving rise to the inabilty occurred prior to the order, however, the exemption may relate back to the date on which the inability to comply arose. Thus, the source owner will not be prejudiced by a delay in finalizing the order or decree.

5. The statute authorizes the issuance of delayed compliance orders (DCOs) which extend beyond July 1, 1979, or the issuance of DCOs after July 1, 1979. Such DCOs could serve as a predicate for an exemption for inability to comply.

Response: Section 113(d)(1)(D) provides that a DCO must "provide for final compliance as expeditiously as practicable but * * * in no event later than July 1, 1979, or three years after the date for final compliance" specified in the SIP, whichever is later. Thus, unless the SIP specified a final compliance date later than July 1, 1976, EPA may not issue or approve a DCO with a final compliance date later than July 1, 1979.

6. A source that has made a substantial commitment to replacing an old facility should be eligible for an inability to comply exemption. This should be available even if complicance might have been achieved by means other than replacement.

Response: EPA disagrees. Noncomplying sources that are replacing facilities have nonetheless enjoyed economic benefit from delay. No exemption for such sources is authorized in the Act or legislative history. EPA does, however, wish to encourage replacement and has accordingly provided that the source, within the framework of the economic model, may use the costs of the replacement facility as a credit against the penalty.

7. EPA should not assess penalties against sources that have installed pollution control equipment which has occasional periods of violation.

Response: Any source in violation of emission limitations is subject to the penalty unless exempted. The mere installation of pollution control equipment does not exempt a source, since the source owner may still be avoiding O&M costs. If no economic savings resulted from the occasional violation, however, no penalty is assessable. Where occasional violations do result in benefit, several exemptions might be applicable. There is no statutory basis, however, for exempting all occasional violations. Some may provide the kind of benefit Congress intended to recapture.

8. An exemption should be available for violations caused by phasing in and out of pollution control or process

equipment or both, as well as for routine maintenance operations.

Response: Generally, these procedures are foreseeable and would not, therefore, be considered unavoidable malfunctions. If, however, the source can demonstrate that the above violations meet the criteria for malfunctions established in the regulations, an exemption would be available.

9. A source owner should be automatically exempted for short term violations where EPA or the State has approved the pollution control equipment. It should not have to petition formally for an exemption and satisfy the requirements specified in the regulations.

Response: EPA disagrees. EPA does not approve equipment as such. The source is responsible for determining that the control method is adequate to meet the applicable requirement. The source is also responsible for operating and maintaining the equipment to ensure continuous compliance.

10. Sources that have installed approved control equipment which does not operate as designed should be exempted.

Response: Failure of control equipment to operate as designed may allow a source to get relief under the exemption for inability to comply despite best efforts.

11. A source owner should not have to demonstrate that its pollution control equipment was properly designed in order to obtain an exemption based on a malfunction. Ensuring proper design is not the source owner's responsibility.

Response: EPA disagrees. The source owner must bear the responsibility to purchase and install pollution controls adequate to maintain compliance. The source owner is the person most familiar with any peculiarities of the production process that might make certain types of pollution controls necessary and others inappropriate. There may be instances, however, in which the problems with the control equipment were unforeseeable or unavoidable, or the equipment delivered and installed did not meet the specifications ordered by the source owner. In these situations, the source owner might qualify for an exemption based on inability to comply for reasons entirely beyond his control. EPA will consider all exemption requests on a case-by-case basis.

12. The availability of financing has no bearing on the ability of the source owner to install pollution control equipment. EPA should broaden the definition of economic impossibility to encompass factors included in its proposed nonferrous smelter order regulations (e.g., cost of controls, energy impacts, and non-air health and environmental impacts).

Response: EPA disagrees. In enacting Section 119, Congress directed EPA to consider the cost of compliance, non-air quality health and environmental impacts, and energy considerations when specifying what controls are reasonably available to a nonferrous smelter seeking a nonferrous smelter order. No similar provision is contained in Section 120. Rather, the legislative history of Section 120 indicates that Congress limited the economic impossibility exemption to an inability to obtain financing due to temporary, verifiable general market conditions. (See discussion in preamble). The purpose of Section 120 is not to determine which type of control equipment is reasonably available to the firm, but rather to recover the economic benefits that the firm enjoys by not satisfying applicable legal requirements.

13. EPA should consider overall air quality impacts in assessing penalties. It is unfair that one source could be in violation for emitting less pollution than another source that is in compliance.

Response: The Act is clear. A State may regulate its sources in any manner sufficient to attain and maintain the national ambient air quality standards. The State having made the necessary judgments, a source is subject to Section 120 if it violates the SIP or other applicable requirements. It would be improper for EPA, except within the limited framework of the exemption provisions, to use the penalty provisions to second guess the State's assessment of the impact of a particular source's emissions on air quality.

14. The provision that a source is insulated from penalty assessment only for the period during which its inability to comply was entirely beyond its control fails to take into account the fact that compliance may not immediately result when the cause of the inability is removed.

Response: The regulations do not limit the duration of an inability to comply exemption to the time during which the event causing the inability actually exists. Rather, EPA will exempt that period of noncompliance that followed unavoidably from the event that caused the inability. For example, if a source that had been in compliance experienced a fire in its control equipment, it would be exempt until it had rebuilt its equipment in accordance with the expeditious schedule contained in a DCO or consent decree. This issue is discussed in more detail in the preamble.

15. EPA should consider the financial condition of the individual source in determining entitlement to an exemption based on economic impossibility.

Response: EPA disagrees. To make the individual circumstances of a firm the relevant test would go considerably beyond Congressional intent and would be administratively unworkable. As noted in the preamble, the test for economic impossibility articulated by the House committee focused on the conditions existing in the capital markets as a whole, rather than on the individual source. Even if consideration of the financial condition of the individual source were appropriate, an accurate determination of a particular source's ability to pay would not be workable in practice. It would necessitate that the source submit, and EPA analyze, extensive (and even then not necessarily conclusive) data relating among other things, to markets, sales, and past and anticipated financial actions. EPA does not believe that Congress intended for it to review a source's economic history in this fashion.

III. Timing/Due Process

1. Penalty should be calculated from the date a source receives notice, rather than date of issuance of the notice.

Response: EPA agrees. While § 120(d)(3)(C)(ii) provides that, for all sources issued a notice of noncompliance after August 7, 1979 the period of covered noncompliance commences on the date of issuance of the notice, EPA believes that it is more equitable to interpret that provision as meaning the date of receipt of the notice and to calculate the penalty from that date. The regulations have been changed accordingly. This change ensures that all source owners will have the full 45 days provided by the statute in which to respond to the notice.

2. Forty-five days may not be long enough to calculate a penalty or to develop a petition.

Response: The 45 day period is a statutory deadline. Moreover, the regulations permit the source owner to submit additional information after the 45 day period where necessary. A source submitting a petition need not submit an elaborate supporting brief but may summarize the facts and legal arguments that prove it is not in violation or that it is entitled to an exemption in a fashion sufficiently compelling to ensure that a hearing will be granted. The function of the hearing will be to examine the source's contentions in detail.

3. EPA should allow a source to amend its petition within the 45 days, or

after that time if information previously unavailable later become available.

Response: EPA will allow such amendment.

4. The 90 day time period for hearings is too short for adequate exposition of the issues and reasoned decision making.

Response: The 90 day requirement is established by statute. The final regulations do, however, allow for extension of this time period upon agreement of the parties and approval of EPA. Where the deadline for decision making is missed (for whatever reason) the regulations provide, consistent with administrative law, that such slippage would not affect the validity of the proceedings or the accrual of penalties.

5. Precluding a source from raising at an adjudicatory hearing issues that could have been but were not raised in the rulemaking is a denial of due process.

Response: Section 307(b)(2) precludes a source from raising in an individual proceeding under the Act issues that could have been raised in a judicial challenge to the regulations at the time of promulgation. Section 307(d)(7) provides the source with an additional opportunity to seek agency reconsideration of certain issues arising after promulgation.

6. Payment of penalties should be suspended until any legal challenge to the penalty is completed.

Response: A source that petitions for an exemption or reconsideration of the finding of violation will not make penalty payments prior to administrative resolution of the petition. Penalties will, however, be payable after final administrative action notwithstanding the pendency of judicial review, if required. Commencement of payments upon final agency action is consistent with the intent of Congress as expressed in the anti-stay provision of the Act, Section 307(g).

A source that petitions for reconsideration of EPA's recalculation of the penalty will only pay the penalty amount which it itself has calculated until a final administrative decision on the petition has been rendered. At that time, any necessary corrections to the penalty amount or payment schedule will be made.

IV. State Delegations

1. The 10th Amendment requires EPA to approve State programs which are less strict than EPA's.

Response: EPA disagrees. The Administrator is authorized to object to a penalty assessment as less than would be required under federal law. A State can, of course, establish under State law a penalty program of its own. The State acts as EPA's delegate in implementing the Section 120 program, however, and that program must conform to these regulations.

2. A State should be precluded from assessing a higher penalty than would be assessable by EPA.

Response: EPA disagrees. Section 116 allows a State to develop a program that is more stringent than EPA's if the State has adequate legal authority to do so.

3. A State should be able to collect penalties for violations of State requirements even if such requirements are not part of the applicable SIP.

Response: EPA agrees. Section 116 does not preclude assessment of penalties based on non-SIP State regulations if there is authority under State law to do so.

4. EPA's requirement that the predecessor SIP remain in effect until such time as a source demonstrates compliance with new SIP requirements would require a State which has been granted a delegation of authority to issue notices of noncompliance based on violations of requirements that are no longer part of the State program.

Response: Requiring the continuity of predecessor SIP requirements is necessary to assure reasonable further progress towards attainment and maintenance of the ambient air quality standards. If State law prohibits the State from enforcing SIP requirements that have been superseded, EPA would assume primary enforcement authority for these pre-existing provisions.

5. EPA should only have the authority to review a State's adequacy in conducting the program. It should not have the authority to review State decisions on a case-by-case basis.

Response: The Act authorizes the Administrator, on his own initiative, to review any State noncompliance penalty proceeding to determine whether it conforms to the Act and to EPA's regulations. Further, the Act requires that the Administrator undertake such review upon receipt of a petition.

6. The regulations should specify whether appeals from a State hearing decision will lie with the Administrator or with the State court.

Response: Appeals from a State hearing decision will lie with the Administrator. The Act and legislative history indicate that Congress intended an exclusive federal role in ensuring that a State's administration conforms to the Act, and provided a procedure to accomplish this result. Section 120(b)(6) authorizes the Administrator, on his own initiative, to review any State decision and disapprove it if it was not in accordance with the provisions of the Act. This Section also provides that the Administrator must undertake such review upon receipt of a petition.

Allowing a source owner to appeal adverse State decisions to the State courts would frustrate this intent, and could lead to inconsistent interpretations of the Act and EPA's regulations. The only situation in which an appeal would lie with the State court would occur if the State's program was more stringent than required by Part 66 of the regulations. In this situation, appeals from State administrative interpretations of these more stringent provisions would be in accordance with procedures set forth in the State's implementing regulations.

7. The requirement of § 120(b)(5) that State hearings be substantially similar to federal adjudicatory hearings means that State hearings must conform to §§ 554, 556, and 557 of the Administrative Procedure Act.

Response: EPA disagrees. Congress required only that State hearings be "substantially similar" to federal adjudicatory hearings. Part 67 of the regulations ensures adequate protection of due process rights in this respect.

8. The regulations should require that States demonstrate adequate legal authority to carry out the program.

Response: It is for a State to decide whether it requires independent authority to assume delegation. If a State is willing to accept delegation based on federal legal authority, EPA will accept that decision.

V. Calculation of the Penalty

A. General

1. How is the penalty calculated if the notice of noncompliance is received in the middle of the month?

Response: The manner in which EPA will compute a penalty if a notice of noncompliance is received, or final compliance achieved, in the middle of the month is explained at II–4 of the Instruction Manual, Appendix B to these regulations.

2. EPA may not revise the model to recapture additional economic benefit without providing opportunity for public comment.

Response: EPA will continue to consider the question of how to measure such benefits. No source will be assessed a penalty on the basis of additional economic benefit without additional rulemaking by EPA.

3. Opportunity to correct accounting errors should be provided.

Response: Errors of accounting or computation made in the initial calculation will be corrected during the

final adjustment of the penalty. Mere changes in accounting methodology or changes to reflect preferred practice will not ordinarily justify revision of penalty calculations.

4. The model is too complex.

Response: EPA has attempted to formulate a model that is relatively easy to use, while also calculating accurately the economic benefits of noncompliance. The present model accomplishes this result. Making the model less complex would decrease its computational accuracy. This would violate the purpose of the statute. Other models were suggested and evaluated by EPA but were found deficient in some respects as is shown in individual responses below.

5. Certain things are not accounted for in the model: (1) source's political power to have standards changed; (2) changes in demand for product. Thus it may be in source's interest to postpone expenditures in existing facility.

Response: The Agency agrees that the model does not account for the possibility that a noncomplying source may possess the political power to have standards changed. The statute, however, requires that the penalty be based on the economic value that a source enjoys from not complying with applicable requirements. The political power a source does or does not possess is irrelevant to this process.

It is also true that a firm always faces uncertainty about demand for its products, a situation which would often make it desirable to postpone capital expenditures such as those required for pollution control equipment. However, the Agency feels that the added benefit of delayed compliance which results from this factor cannot now be calculated.

6. Section 120(d)(3)(A)'s requirement of equal quarterly payments means equality of nominal not of "real" dollars.

Response: EPA disagrees. The legislative history supports the use of "real" dollars in establishing a payment schedule (See 123 Congressional Record S. 13698 (daily ed. August 4, 1977)). A schedule of payments that does not reflect inflation will over-recover the savings from noncompliance in the early years of equipment life and under-recover the savings in the final years.

7. A weighting factor for severity of noncompliance should be considered.

Response: Except for *de minimis* exemptions, EPA has no discretion to adjust the penalty based on the severity of the violation.

8. No penalty should be assessed where the noncomplying firm showed a net loss for the year.

Response: The discounted cash flow method of evaluating the cost associated with an investment does not rely on an assumption that the firm shows a profit on its overall operations. The assumption is that the firm has the opportunity to invest the funds which should have been used for pollution control equipment in other areas. It is the returns that the source could have realized on these alternative investments that the noncompliance penalty seeks to remove.

9. The penalty creates a disincentive to maintain equipment since maintenance costs will increase the penalty. O&M costs avoided should not be computed.

Response: The Act specifically includes O&M costs avoided as one component of the penalty. EPA believes that a source will choose the most cost effective method of pollution control and that O&M costs will be but one of the factors considered. Failure to attain and maintain compliance, whether or not attributable to inadequate O&M, will lead to additional enforcement by EPA.

10. The model should compute the cost of compliance on the basis of the cheapest method available. This will allow the firm to risk innovation to come into compliance without risking increased penalty.

Response: The Act requires that the penalty be based on the actual costs of compliance. The method chosen to achieve compliance is up to the firm, subject to EPA review for the reasonableness of the compliance effort. A firm which proposes a method of compliance bears the risk of failing to achieve compliance and at a minimum extending the period of covered noncompliance. Since noncomplying firms will be subject to regular enforcement action, EPA believes that firms will choose the most cost effective means of achieving expeditious compliance, i.e., the "cheapest" method in the long run. Compliance based on short-term expedients would, therefore, probably not be chosen. EPA has, furthermore, no reason to conclude that a penalty calculation based on the "cheapest" method of compliance would encourage innovative approaches to compliance.

11. EPA has no authority to assess a 20 percent nonpayment penalty against a source with respect to late payment of the final settlement. Only sanction would be to charge appropriate interest rates as specified in § 120(d)(4)(B).

Response: EPA disagrees. Section 120(d)(5) provides that the late payment penalty applies to *any* late payment. Without a 20 percent late payment fee a source whose historical rate of return on equity was lower than its internal discount rate would find it attractive to avoid making its final payment.

12. Regulations should take into account circumstances that would justify late payments.

Response: EPA has no discretion to waive the requirement of timely payment.

13. The Act provides for adjustment of the penalty from time to time. The regulations make no provision for this. Source should be able to petition for such interim recalculations.

Response: Interim recalculations of the penalty are authorized but not compelled by the statute. Final adjustment of the penalty will generally suffice to ensure that the source has paid the appropriate penalty. On good cause being shown, e.g., a serious miscalculation, or on his own initiative where necessary, the Administrator will re-open the penalty calculation proceeding and, if necessary, adjust the penalty.

14. Should "interest" payments made as part of the final adjustment be considered part of the penalty.

Response: Such payments should be considered as part of the penalty rather than as a separate interest charge. A source owner who underestimates his penalty has the opportunity to realize a rate of return on funds that, had the penalty calculation been accurate, would have been collected by EPA. By assessing such charges at the time of final adjustment, EPA ensures that the full economic value of noncompliance has been captured. If a source owner could deduct such payments as interest for tax purposes, he would be encouraged to underestimate his penalty and will realize further economic benefits.

B. Inputs to the Model

1. EPA should use the same interest rate for both overpayment and underpayment of the penalty.

Response: EPA disagrees. There are sound economic and policy reasons for establishing a dual rate. The rate for underpayments will be identical to the discount rate used to calculate the penalty initially. Use of this discount rate recognizes that to the extent the source owner has underpaid the penalty, he has continued to derive some economic benefit from his noncompliance. Establishing a rate for underpayments that is lower than the rate of return available to the source owner creates an incentive to underpay the penalty. The source owner would be able to invest the shortfall (which should have been spent on compliance efforts) and receive a positive rate of

return. To the extent that the rate established for the underpayment was lower than the rate of return available to the source owner, EPA would not have recovered the full economic value that the source owner received from his noncompliance.

Using the same rate for overpayments of the penalty, however, would not be appropriate. Government paper is relatively risk free. If the rate established for over-payments were equal to the discount rate, source owners would have an incentive to overpay the penalty deliberately. In essence, these source owners would be making a short term deposit of funds in an account yielding a higher rate of return than would be available on the open market for alternative investments of comparable risk. To the extent that the discount rate was higher than the rate of return available for investments of comparable risk on the open market, the Treasury and, indirectly, the taxpayer would be subsidizing the noncomplying source. To prevent such deliberate overpayment of the penalty, the Department of the Treasury and EPA have selected as the rate of return on overpayments the rate of return available on Treasury instruments having a duration similar to the period of covered noncompliance.

2. Reliance on IRS Revenue Procedure 77–10 to determine the life of pollution control equipment is unjustified. The actual physical life of controls depends upon several factors and could differ from the useful life figures in the IRS guidelines.

Response: Some assumption about the useful life of pollution control equipment is necessary to enable EPA to calculate the economic benefits of delay associated with replacement of control equipment. EPA selected the IRS guidelines to provide this information because the guidelines are readily available, and because they are familiar to and used by businesses. This is so despite the fact that the actual life of a particular piece of pollution control equipment, like that of other types of equipment, may vary from useful life estimates.

As noted in the preamble, EPA recognizes that it may be possible to develop useful life estimates that are more accurate than those contained in the IRS guidelines. If such data becomes available, EPA will propose its use for public comment.

3. The model should use inflation indices already in existence for particular industries, e.g., the Handy Whitman Index, Marshall and Swift's comparative cost tables and Standard and Poor's Auto and Auto Parts Index. The model should also recognize the possibility that the price of a particular piece of control equipment may inflate faster than the inflation index presented in *Chemical Engineering Plant Cost Index.*

Response: EPA has reviewed most of the indices suggested by commenters. Even assuming that comparable indices were available on an industry-by-industry basis, the use of a single index to estimate inflation in pollution control equipment costs remains preferable to the use of multiple indices. This is because the function of the selected index in the model is to represent industry experience with pollution control equipment cost. It does not represent each industry's own experience with production costs. While the cost of a particular item of pollution control will vary to some extent with the industry, such variation may or may not correlate with that industry's inflation index. It is, for instance, at least as reasonable to assume that the price of the same pollution control equipment in two industries moves at the same approximate rate as to assume that it will vary with each particular industry.

4. Use of an identical inflation rate for capital and O&M costs may not be accurate since increases in labor, material and construction equipment costs all affect capital while labor is the primary reason for increased O&M costs. O&M could be based on a regional wage index.

Response: Increased O&M expenditures may reflect increased energy, chemicals, and other materials costs, as well as increased labor costs. EPA believes that the designated inflation index reasonably represents the appropriate cost components.

5. The relative tax position of the firm should not affect the penalty, which should be indifferent to the tax bracket of the firm.

Response: The firm's tax bracket directly affects the level of economic benefits resulting from noncompliance since it affects the real cost of the investment. The higher the firm's tax bracket, the greater the marginal impact of the deduction or credit, and the lower the benefit of delay.

6. The tax rate should be the maximum statutory rate of 46 percent. Since the penalty is so sensitive to the marginal tax rate, using a general tax rate makes sense.

Response: EPA disagrees. Section 120 of the Clean Air Act requires that the noncompliance penalty remove the economic benefit of noncompliance. That benefit will vary with the actual tax rate of the source. Use of a flat maximum would understate the penalty for firms not taxed at the maximum rate. However, since the maximum marginal federal tax rate of 46 percent applies to all pre-tax income in excess of $100,000 most, if not all, major pollution sources may be expected to use this rate.

7. EPA should define what constitutes a tax exempt industrial development bond.

Response: Section 103 of the Internal Revenue Code defines the term "industrial development bond" and provides special tax treatment for bonds issued "as part of an issue substantially all of the proceeds of which are used to provide . . . air or water pollution control facilities." Determining whether a particular bond satisifies these criteria and is thus eligible for special tax treatment lies with the Internal Revenue Service.

8. The model should assume that, where industrial development bonds are issued, the purchase of pollution control equipment will be financed by debt to the extent that industrial development bond (IDB) funding is available. The result of assuming that industrial development bond financing will establish the cost of debt but will not alter the financing structure is to distort the actual cost of financing since the higher cost of equity (due to disqualification for investment tax credit) and the true cost of debt for the particular project are not fully recognized.

Response: The use of industrial development bond financing gives rise to several problems. Since the availability of such bonds is limited to particular projects, their use requires a breach of the rule against costing of investment by assuming particular forms of financing. On the other hand, the fact remains that additional debt will, all else being equal, in the long term prompt the equilibrium-seeking firm to augment equity accounts.

Recognizing that a firm will likely choose to avail itself of low cost debt financing does not mean that the long term equilibrium assumption must be abandoned. The model's use of the IDB rate in conjunction with its assumption of a contant capital structure is a pragmatic resolution of the theoretical problem.

One commenter pointed out, in addition, that EPA's treatment can have a perverse effect in some circumstances, i.e., where a firm's debt to equity ratio is low. EPA acknowledges that such a perverse effect can arise but considers that such effects could not be alleviated without making the model considerably more complex.

9. If pollution control bonds are used as a source of financing, the effective

interest rate of the bonds should be used instead of the current rate of interest on bonds of a grade equal to the firm's bonds.

Response: The Agency agrees with this comment. The final regulations call for using a weighted average of the corporate bond interest rate and the rate on industrial development bonds.

However, using this weighted average approach does not in all cases fully account for the beneficial effects of using industrial development bonds. If a firm has a low debt share in its capital structure, the model may slightly underestimate the cost-reducing impact of IDB's. This in turn will result in a slight overstatement of the economic benefit of noncompliance. The Agency believes that the magnitude of this overstatment is too small to make it necessary to adjust for it.

10. Use of present rather than historic interest rate on debt is inconsistent with use of historic inflation and discount rates. Interest rate should also be based on a 20 quarter average.

Response: The Agency has sought to require use of that data which will provide the most meaningful estimates of the various parameters. In the case of the rate of interest on long term bonds, current rates are a better estimate of the marginal cost of compliance than averages, and they are readily available.

11. Capital cost of compliance should include cost of working capital.

Response: The amount of working capital required to install and operate pollution control equipment is very difficult to estimate. While, in theory, it constitutes one of the costs avoided by delay, the amount would probably be small. For this reason, and for administrative reasons, it is excluded from the penalty calculation.

12. The designation of the FTC's *Quarterly Financial Report for Manufacturing, Mining and Trade Corporations* as the source of an equity discount rate is mistaken. A conglomerate is potentially subject to reclassification between industrial categories, changing the amount of the penalty without significant change having occurred to the noncomplying source.

Response: The possibility of reclassification does not warrant use of some other index. If reclassification occurs and has an impact on the penalty, proper adjustment can be made through an interim recalculation if appropriate or at the final adjustment.

13. The debt-to-equity ratio cannot be estimated for all firms.

Response: EPA disagrees. The debt-preferred stock-common equity ratio can be estimated from the firm's balance sheet. Where the noncomplying source is owned by a firm which itself is a joint venture of two or more firms, the mix existing in the capital structure of the joint venture would be used in the penalty calculation. In the case of conglomerates and similar diversified companies, the appropriate balance sheet will be that of the smallest entity with audited financial statements which includes the source not in compliance.

14. It is arbitrary for the penalty to change depending on the ratio of debt to equity in the firm's capital structure.

Response: EPA disagrees. Firms with low debt-equity ration have a higher proportion of more expensive equity in their capital structure. Thus, the present value of their pollution control costs will generally be higher. It follows that the economic benefit of delaying these costs will also be greater and the noncompliance penalties will reflect that increased benefit. The increased penalty merely reflects the firm's relatively higher financing costs.

C. Discount Rate/Inflation Rate

1. The use of an equity discount rate wrongly equates return on equity with the cost of equity. The firm with the highest risk will experience the highest cost of equity, but will not necessarily experience the highest return.

Response: While the theoretical possibility exists that the firm with the highest rate of return on equity will not be the firm with the highest cost or risk, in practice there is a correlation between risk and return. More significantly in terms of the model, the equity rate is only used as an estimate of the rate of return which may be achieved by the firm. It does not equate the return on equity with the cost of equity.

2. The use of an average return on equity improperly assumes that all firms are alike.

Response: The use of an average is not intended as a statement that all firms are alike but as a statement that all have similar long run investment opportunities and, upon settlement, as a simplifying assumption that the firm's average return on its (untraceable) alternative use of capital equals the average enjoyed by the industry or all manufacturers.

3. EPA should use market values where available in lieu of book values for establishing the equity discount rate.

Response: EPA disagrees. Relying on market share values to determine the equity discount rate has several drawbacks. First, the market value of shares is often influenced by short term trends and non-economic factors. Additionally, market values would provide a meaningful measure only for those relatively few companies whose shares are widely held and actively traded. EPA lacks the capability to analyze the market to determine whether particular shares satisfy these criteria and would thus be an appropriate indicator for the equity discount rate.

4. The use of an averaged return (on equity) means that the highly leveraged firm pays a lower penalty than if the rate were firm-specific. The highly leveraged firm has more debt, and therefore will have a higher cost of equity (and associated return) and should enjoy a greater benefit from delay than the firm not so highly leveraged. Conversely, the lower leveraged firm will pay a higher penalty than it should due to the averaging in of returns from higher leveraged firms.

Response: The problem described arises from the nature of averages. The effect should be reduced by the fact that the higher-leveraged firm will have higher debt costs but a higher proportion of debt, i.e., possibly a relatively "low" weighted average capital cost which would reduce needed returns.

5. The designation of the FTC's *Report* is mistaken because it is not designed to measure a future discount rate, because the use of a 20-quarter historic average does not reflect business practice in projecting such a rate, and because industry-wide averages such as the *Report* generates are unrelated to and should not be used in conjunction with firm-specific figures (such as the tax rate). Difficulties in arriving at firm-specific figures do not warrant resort to arbitrary averages.

Response: The use of a 20-quarter book-based historic average in lieu of an internal hurdle rate, market value, econometric projection or other basis of estimation results from the necessity to use a reasonably ascertainable and verifiable figure. The rate specified by EPA is both available and easily ascertainable. Whether or not it is used in industry planning is not relevant. There is no inherent reason that the use of the designated average will not provide a reasonable estimate of the firm's future discount rate since it reflects an average of an industry's immediate past experience. The fact that it is not a firm-specific rate does not make its use in conjunction with firm-specific inputs improper. It describes the opportunities available to the firm in the context of the firm's own industry or the economy as a whole.

6. Using historical averages, which are retrospective, to predict future values is questionable. Econometric models are prospective and, therefore, better.

Response: Historical values are used because such values are readily available and applicable to a wide variety of industries. As is explained in the Technical Support Document, the fact that the model is sensitive to the difference between the inflation and discount rates, and the fact that this difference may be expected to remain relatively constant, will counteract the unavoidably retrospect bias of the data. The final adjustment of the penalty will provide a second corrective to the use of historical averages, since those averages will be updated at that time.

Econometric models do not exist for all of the parameters which must be estimated. Such models often disagree, moreover, on their predictions of future indices and rates. EPA considered that the complexity, incompleteness and controverted nature of econometric models were disadvantages that outweighed conceivable advantages.

7. The model should not assume a constant relation between the discount rate and the inflation rate, particularly where the inflation rate does not reflect price changes in the total economy but only in part of it.

Response: It is true that the relation between a general discount rate and a general inflation rate will not necessarily be constant, and that the relationship between a general discount rate and a less general inflation rate will be somewhat less constant. But the assumption of a correlation is reasonable given the inflation component of the discount index used. The other components are generally considered to be a pure time value of money and risk.

8. The model should allow the rate of inflation to exceed the discount rate.

Response: The Instruction Manual provides that, where the inflation rate exceeds the discount rate, the source owner must set the discount rate equal to the inflation rate. This is the case with respect to both the capital and O&M components. This treatment results in the calculation of a zero benefit in the capital portion of the penalty, and is conservative in that it does not recognize the residual value which accrues from displacing the last replacement more than 30 years into the future. This treatment will also result in the calculation of a positive benefit in the O&M portion of the penalty. The calculation of an O&M component of the penalty where the inflation rate equals or exceeds the discount rate is appropriate since O&M costs not incurred are avoided forever rather than merely postponed. The model does not allow O&M costs to be reduced by the extent to which negative capital costs would have been incurred if the inflation rate was permitted to exceed the discount rate. Correspondingly, however, the model does not recognize that O&M costs would be increased if inflation were greater than the discount rate. The two effects of the administrative simplification employed should tend to counteract each other.

9. The model should use a pre-financing return to establish the discount rate, not an equity rate.

Response: A pre-financing rate would not measure the benefit of delay to the firm. A pre-financing return would typically compute a return on capital assets without regard to financing or to capital structure. The embedded cost of debt in such case would be built into the rate of return. Such an embedded cost is unlikely to be equal to the cost of debt faced by a firm buying pollution control equipment. The return to the firm on its capital assets would not necessarily equal the return available to the firm by delaying such purchase either. To compute the benefit to the firm of delay, it is necessary to use a rate of return which reflects the costs at the margin of using debt and equity. The equity method accomplishes this, as would a weighted average cost of capital method which allocated appropriate weights to each component and assigned a marginal cost of each.

10. The final calculation should provide for the use of inflation and other rates experienced during the period of covered noncompliance.

Response: Several historical rates are used in calculating noncompliance penalties. The most important in terms of their impact on the magnitude of penalty are the inflation rate and the discount rate.

The inflation rate, which measures the rate of increase in pollution control costs, is used in estimating the magnitude of expenditures over time, both for replacement of capital equipment and for operating and maintenance expenses. The inflation rate should represent the best estimate of the rate of growth of such costs.

The discount rate is used to convert the resulting cash flows into their present value equivalents. Thus, the discount rate should reflect the opportunity cost of capital, or the future returns available on alternative investment projects. EPA has determined that the best available estimate of such rates, and therefore the best estimate of the benefit of delay at a particular time, is an average of historical rates. The problem is then one of selecting the appropriate time span over which the average is to be taken. The most recent five years was chosen because it is long enough to smooth out random fluctuations but short enough to capture the impact of changing trends.

When the penalty calculation is made at the time of the post-compliance settlement, the most recent five years will normally include the entire period of covered noncompliance. If only the period of covered noncompliance were used to determine these rates, the quality of the estimates would suffer because of the possible presence of random fluctuations. Limiting the calculation to the period of covered noncompliance is not appropriate. Such a limitation would ignore that a firm may be expected to enjoy long term, as well as short term benefits from delay, i.e., that the "portfolio" of investments will be mixed. The use of five year averages to estimate the benefits presently accruing to the firm during the period of covered noncompliance from this "mixed" portfolio recognizes that the estimates must represent a period greater than the period of covered noncompliance.

11. The penalty should use the actual rate of inflation during the period of covered noncompliance.

Response: The benefits which accrue from delay are not limited to those which accrue during the period of covered noncompliance. While inflation experienced during that period is relevant, using the actual inflation rate during the period of noncompliance would ignore these long-term benefits of costs deferred. The principal function of the inflation rate is to estimate replacement capital costs. The five year average is the best available figure which is representative of inflation in the future. A shorter period (as EPA assumes most periods of covered noncompliance will be) is too subject to variation.

D. Credits

1. It is unlikely that monthly expenditures for major capital projects can be predicted accurately. Expenditures should be divided on a quarterly basis.

Response: In order to determine the amount of any appropriate credits, it is necessary to know the timing and amount of the precompliance capital expenditures made by the source owner or operator. Requiring the use of a monthly schedule of capital expenditures enables EPA to calculate the economic benefits of non-compliance more accurately than would be possible if quarterly schedules were used. Any errors in estimating the amount or timing of precompliance expenditures can be corrected at the time of post-compliance settlement.

2. Separate treatment of the capital and O&M components of the penalty is unjustified. A precompliance expenditure made for O&M should reduce the entire penalty, not merely the O&M component of the penalty.

Response: EPA disagrees. The cash flow resulting from delaying capital expenditures differs from the cash flow resulting from delaying O&M expenditures. By choosing not to comply on time, the source owner is able merely to *defer* making necessary capital expenditures for a certain period. In contrast, O&M costs not incurred during that period of delay are avoided forever. Because of the different nature of these cash flows, it would be inappropriate to allow precompliance expenditures made on one component to be used as an offset for the other. (For an expanded discussion of this issue, see the Technical Support Document, App. A).

3. The model should take into account the reduced operating costs resulting from the installation of more efficient pollution controls, or controls that result in improved product recovery.

Response: Section 120(d)(2)(A) specifies that, in calculating the economic benefits of non-compliance, EPA must consider the "operation and maintenance costs foregone as a result of non-compliance." A source owner expending O&M funds on existing pollution controls reduces the level of his economic savings.

A similar effect on the firm's cash flow is experienced when new control equipment enables the source owner to improve product recovery. The Technical Support Document explains how a penalty should be calculated in this case.

4. Credit should be given for expenditures which reduce emissions in the interim, even if the means used are unrelated to the controls needed to achieve final compliance. Air quality benefit justifies this credit, as does the language in Section 120(d)(2) that provides credit for *any* expenditure made towards bringing source into compliance.

Response: As a general rule, allowing credits for expenditures made to achieve interim emissions reductions would not be appropriate. The Act specifies the factors EPA is to consider in calculating the penalty. Section 120(d)(2)(A) provides that the basic penalty will be calculated on the costs being avoided by a source owner who has not complied with applicable legal requirements. Section 120(d)(2)(B) limits the granting of credits to expenditures made to achieve compliance with those legal requirements which formed the basis of the original penalty calculation. There may be situations, however, in which expenditures made by the source owner to achieve interim emissions reductions acted to reduce the level of economic benefits, thus lowering the penalty.

E. Miscellaneous

1. The economic model is deficient in that retained earnings are ignored.

Response: Retained earnings are included in the model as a source of long term financing. See page IV–10 of the Technical Support Document.

2. The model treats lost production during construction as a depreciable capital expenditure. This cost, however, is not subject to the investment tax credit, with a resulting overstatement of penalties.

Response: The model treats lost production as a component of O&M cost. Thus, no depreciation or investment tax credit problems arise.

3. A source should have an opportunity to show that no returns were enjoyed on funds that should have been spent on the installation of pollution control equipment.

Response: A firm without funds to invest, in pollution control equipment or otherwise, still obtains a savings from delay. The firm has avoided having to borrow funds to finance the necessary construction, and has kept its borrowing capacity available for other purposes. By not complying it avoids both this step and the capital costs that follow it.

4. Sources should be permitted to use a model which computes a yearly penalty based on estimated capital cost multiplied by a firm's return on total capital. Such a return would equal net earnings divided by total capital assets employed. Even so, such a penalty would overstate the value of delay during inflation since use of book values overstates returns and since depreciation allowances are not based on replacement costs. The use of a return on total capital assets is better than an equity return since it removes any incentive to manipulate debt levels to lower the rate of return on equity.

Response: The model based on return on total capital has several shortcomings. A yearly calculation would probably present unwarranted administrative burdens, since yearly verification of each non-complying source's computation would be required, and since each computation could require hearings and opportunity for review. The discount rate proposed would involve embedded costs of debt and would not describe the opportunity cost faced by the complying firm. The accounting issues involved in restating book values and depreciation reserves to account for inflation are presented by all models. It is not unreasonable for a firm which has operated in inflated dollars to pay a penalty stated in the same dollars. Emergent accounting conventions regarding restatement of returns in constant dollars are not well enough settled in any event to permit their use, even if they could be used without abandoning the relative conceptual and computational simplicity of the model. As to the possibility of manipulation, EPA does not believe that the possibility is more than speculative, or that the proposed model constitutes a better remedy than simply policing penalty calculations. The model, finally, does not appear to take into account the benefits to the firm which accrue from displacing into the future the need to replace pollution control equipment.

5. Entities not subject to the income tax unfairly pay a much larger penalty than those who are.

Response: It is true that entities not subject to income taxes will normally pay a much larger penalty than profit making, tax paying firms. The reason for this is that the penalty must be set so as to reflect the economic benefit of noncompliance. This benefit is greater for organizations which pay no income tax.

Tax paying organizations realize a lower benefit from noncompliance because the entire expense avoided through a failure to install and operate pollution control equipment does not flow through to the benefit of the firm. Approximately one-half is lost to income taxes. Thus the gain to the noncomplying, tax paying firm will generally be about one-half of that experienced by an entity not subject to income taxes.

6. Entities which finance entirely out of debt should use a cost of debt related discount rate and should be assumed to have 100 percent debt financing.

Responses: Not all entities have shareholders, but that does not mean that the balance sheets of those firms do not contain capital components which are the functional equivalent of equity supplied by investors. An examination of such balance sheets and of a sample of rate cases shows that entities without stockholders nonetheless calculate returns on the basis of a mix of debt and equity. The mix so stated or assumed is an appropriate basis for a noncompliance penalty calculation.

7. Governmental facilities which are financed by appropriations should be exempted from the penalty.

Response: The use of appropriations to finance pollution control equipment purchases rather than the use of debt or equity poses the conceptual difficulty of establishing an appropriate discount

rate. It does not suggest a basis for exemption. In line with the recommendation of the Office of Management and Budget, the penalty will compute using a 10 percent real discount rate.

8. Municipally owned utilities are statutorily exempted because federally owned entities are included.

Response: Municipalities are covered by the Act, *see* Section 302(e). The rationale for inclusion of one kind of governmental facility applies with equal force to all governmental facilities, and more so to those not financed by appropriations.

9. Utilities will have a return through ratesetting on the pollution control equipment. The return reduces the benefit to them of delay.

Response: Utilities are allowed to include PCE costs in their rate base for purpose of setting a rate of return. But establishment of an allowed rate does not guarantee that the rate will be earned. Unregulated industries may also pass through costs, although generally speaking in a less monopolistically structured economic environment. The extent of cost pass through is more a function of market structure than of regulation. The statute does not require a calculation of the extent of possible pass through since the relevant decision maker is the firm, which enjoys the benefit of alternative investment, improved market position, etc., and which may or may not distribute such benefits.

10. In the case of utilities, a special model should be used which reduces the penalty to the extent the benefit of delay is passed through to ratepayers, and which computes the benefit of delay to shareholders as only consisting in the postponement of the regulation-induced lag in flowing through costs to ratepayers.

Response: No special model is required for utilities by virtue of their being regulated or by virtue of their use of a rate rather than price mechanism to pass costs through. Both regulated and unregulated industries will seek to pass through costs. More generally, there is no statutory warrant for reducing the penalty to the extent costs, had they been incurred, might have been flowed through to customers rather than to shareholders. The contrary is more consistent with the statute. Such costs, having been avoided, may improve the market position of the regulated and unregulated firm alike. Such favorable changes in market position represent benefits that the statute authorizes EPA to calculate and to recoup. Such recapture would tend to make the relevant decision-maker, i.e., the firm, indifferent to the benefit of delay.

11. Rural electric utility cooperatives are not entities for profit and finance construction out of debt. The penalty should either be zero or should be based on the cost of debt financing.

Response: The fact that a firm makes no profit does not mean that it enjoys no benefit from delay. It is, for instance, able to avoid costs and to avoid price changes. Similarly, the fact that a firm has no shareholders does not mean that equity is absent from its capital structure. Rural electric cooperatives rates are based on cost of money which includes debt and equity components.

12. Since electric power cooperatives are non-profit, many of the parameters applicable to the calculation are not applicable.

Response: Each of the parameters in the penalty calculation is necessary to estimate the economic benefit from delayed compliance. In some instances, the parameters will have a zero value, such as the income tax rate for non-profit organizations.

Title 40 of the Code of Federal Regulations is amended by adding new Parts 66 and 67 as set forth below:

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Appendix C—Computer Program.
Note: Appendixes A, B, and C appear after Part 67.

Authority: Sec. 120, Clean Air Act, as amended, 42 U.S.C. 7420.

Subpart A—Purpose and Scope

§ 66.1 Applicability and effective date.

(a) This Part applies to all proceedings for the assessment by EPA of a noncompliance penalty as provided by Section 120 of the Clean Air Act. This penalty is designed to recover the economic advantage which might otherwise accrue to a source by reason of its failure to comply with air pollution control standards after receipt of a notice of noncompliance.

(b) These regulations shall be effective October 27, 1980.

§ 66.2 Program description.

This Part sets forth the procedures by which EPA will administer the noncompliance penalty provisions of Section 120 of the Clean Air Act. Subpart A describes the scope of the Part, defines key terms and states the manner of operation of these provisions Subpart B states which sources of air pollution are subject to these penalties and the form and substance of the notice of noncompliance. Subpart C and the

accompanying Technical Support Document and Manual state how a source must compute the penalty which it owes. Subpart D describes the conditions under which an exemption from the penalty may be available, and Subpart E sets forth the procedures for requesting such an exemption. Subpart F states how EPA will review penalties calculated by sources under Subpart C, and Subpart G describes the method of payment. Subpart H provides for adjustment of the penalty after the source has come into compliance and the actual costs of doing so are known. Finally, Subpart I states which actions under these regulations are subject to judicial review and on what conditions, and Subpart J provides supplemental procedures for adjudicatory hearings.

§ 66.3 Definitions.

In this Part and Part 67:

(a) "Act" means the Clean Air Act, 42 U.S.C. 7401 *et seq.* as amended on August 7, 1977, except where the context specifically indicates otherwise.

(b) "Affiliated entity" means a person who directly, or indirectly through one or more intermediaries, controls, is controlled by, or is under common control with the owner or operator of a source.

(c) "Applicable legal requirements" means any of the following:

(1) In the case of any major source, any emission limitation, emission standard, or compliance schedule under any EPA-approved State implementation plan (regardless of whether the source is subject to a Federal or State consent decree);

(2) In the case of any source, an emission limitation, emission standard, standard of performance, or other requirement (including, but not limited to, work practice standards) established under Section 111 or 112 of the Act;

(3) In the case of a source that is subject to a federal or federally approved state judicial consent decree or EPA approved extension, order, or suspension, any interim emission control requirement or schedule of compliance under that consent decree, extension, order or suspension;

(4) In the case of a nonferrous smelter which has received a primary nonferrous smelter order issued or approved by EPA under Section 119 of the Act, any interim emission control requirement (including a requirement relating to the use of supplemental or intermittent controls) or schedule of compliance under that order.

(d) "Approved Section 120 program" means a State program to assess and collect Section 120 penalties that has been approved by the Administrator.

(e) "Computer program" means the computer program used to calculate noncompliance penalties under Section 120 of the Clean Air Act. This computer program appears as Appendix C to these regulations.

(f) "Control" (including the terms "controlling", "controlled by", and "under common control with") means the power to direct or cause the direction of the management and policies of a person or organization, whether by the ownership of stock, voting rights, by contract, or otherwise.

(g) "Major stationary source" means any stationary facility or source of air pollutants which directly emits, or has the potential to emit, one hundred tons per year or more of any air pollutant regulated by EPA under the Clean Air Act.

(h) "Manual" means the "Noncompliance Penalties Instruction Manual" which accompanies these regulations. This Manual appears as Appendix B to these regulations.

(i) "Owner or operator" means any person who owns, leases, operates or supervises a facility, building, structure or installation which emits or has the potential to emit any air pollutant regulated by EPA under the Act.

(j) "Potential to emit" means the capability at maximum design capacity to emit a pollutant after the application of air pollution control equipment. Annual potential shall be based on the larger of the maximum annual rated capacity of the stationary source assuming continuous operation, or on a projection of actual annual emissions. Enforceable permit conditions on the type of materials combusted or processed may be used in determining the annual potential. Fugitive emissions, to the extent quantifiable, will be considered in determining annual potential for those stationary sources whose fugitive emissions are regulated by the applicable state implementation plan.

(k) "Source" means any source of air pollution subject to applicable legal requirements as defined in paragraph (c).

(l) "Technical Support Document" means the "Noncompliance Penalties Technical Support Document" which accompanies these regulations. The Technical Support Document appears as Appendix A to these regulations.

All other terms are defined as they are in the Act.

§ 66.4 Limitation on review of regulations.

No applicable legal requirement, which could have been reviewed or challenged by means of the timely filing of an appropriate petition, no provision of this Part or Part 67 or Appendices A, B or C, may be challenged, reviewed or re-examined in any hearing conducted under this Part or Part 67. This limitation on review includes, but is not limited to:

(a) Arguments that the statute is more or less restrictive than the regulations, e.g., that exemptions other than those provided herein should be granted.

(b) Arguments that the economic model does not accurately calculate the economic benefits of noncompliance, or that parameters, terms and conditions other than those provided for in the model should be used or that evidence other than that described in the Technical Support Document for establishing inputs should be considered.

§ 66.5 Savings clause.

Proceedings under these regulations for imposition of a penalty under Section 120 are in addition to any other proceedings related to permits, orders, payments, sanctions or other requirements or State of Federal law. No action under this Part or Part 67 shall affect in any way any administrative, civil or criminal enforcement proceeding brought under any provision of the Clean Air Act or State or local law.

§ 66.6 Effect of litigation; time limits.

(a) The existence of any litigation on the validity of these regulations shall not affect the authority of the Agency to issue notices of noncompliance or to conduct subsequent administrative proceedings under Parts 66 and 67.

(b) Failure of the Administrator or the Presiding Officer at a hearing to meet any of the time limits contained in Parts 66 and 67 shall not affect the validity of any proceeding under these regulations.

(c) The filing of any petition for reconsideration under this Part or Part 67 or the institution of EPA review of a State determination under Part 67 shall not toll the accrual of noncompliance penalties. The penalty will be calculated from the date on which the source owner or operator receives a notice of noncompliance.

Subpart B—Notice of Noncompliance

§ 66.11 Issuance of notices of noncompliance.

(a) The Administrator shall issue a notice of noncompliance to the owner or operator of any source which he determines is in violation of applicable legal requirements and which is located in a State without an approved Section 120 program.

(b) The Administrator shall send a notice of noncompliance to the owner or operator of any source located in a State with an approved Section 120 program

when he determines as provided in Part 67 that the source is in violation of applicable legal requirements and the State has failed to send a notice of noncompliance to it, or has failed to pursue diligently any subsequent steps for the assessment or collection of the penalty.

(c) Failure of EPA or a State to issue a notice of noncompliance within 30 days after discovery of a violation shall not affect the obligation of a source owner or operator to pay a noncompliance penalty but shall affect the date from which the penalty is calculated. The penalty shall be calculated from the earliest date that the owner or operator of the source received a notice of noncompliance under this section, whether issued by EPA or the State.

§ 66.12 Content of notices of noncompliance.

(a) Each notice of noncompliance shall be in writing and shall include:

(1) A specific reference to each applicable legal requirement of which the source is in violation;

(2) A brief statement of the factual basis for the finding of violation, together with a reference to any supporting materials and a statement of when and where they may be inspected;

(3) Instructions on calculating the amount of the penalty owed and the schedule for payments. Such instructions shall include (i) a statement of the date from which penalties should be calculated and (ii) a copy of the Technical Support Document and the Manual;

(4) Notice of the right to petition for a hearing to challenge the finding of noncompliance or to claim an exemption; and

(5) Notice that the penalty continues to accrue during the pendency of any hearings granted under this Part or Part 67.

(b) Each notice of noncompliance shall be transmitted to the source owner or operator either by personal service or by registered or certified mail, return receipt requested.

§ 66.13 Duties of source owner or operator upon receipt of a notice of noncompliance.

(a) Within forty-five days after receiving a notice of noncompliance a source owner or operator shall either:

(1) Calculate the amount of the penalty owed and the appropriate quarterly payment schedule, as provided in the Technical Support Document and Instruction Manual, and transmit that calculation, together with supporting data sufficient to allow verification of the penalty calculation, to the Administrator; or

(2) Submit a petition for reconsideration, alleging that the source is not in violation of applicable legal requirements or that the source owner or operator is entitled to an exemption pursuant to Sections 66.31 through 66.33, or both. A source owner or operator must present both grounds in the petition if he wishes to preserve a claim to an exemption in the event that the source is found to be in violation. Issues relating to the existence of a violation or entitlement to an exemption not raised in the petition shall be deemed waived.

(b) Any submittal pursuant to this subsection shall specify the identity of the person responsible for the payment of any noncompliance penalty, and to whom any reimbursement, if necessary, shall be sent.

(c) A source owner or operator may amend any petition for reconsideration pursuant to subsection (a) above within 45 days from receipt of a notice of noncompliance. Amendment of such petition after 45 days will be permitted only if based on unforeseeable conditions occurring after termination of the 45 day period, or upon consent of the Administrator.

Subpart C—Calculation of Noncompliance Penalties

§ 66.21 How to calculate the penalty.

(a) All noncompliance penalties shall be calculated in accordance with the Technical Support Document and the Manual.

(b) Where the Administrator determines that no existing technology or other emissions control method results in emission levels which satisfy the applicable legal requirement, the penalty calculation shall be based on the cost of the capital equipment, operation and maintenance practices, or other methods of control which best approximates the degree of control required. In such a case, the Administrator may include in the penalty the costs of participation in an EPA approved research and development program where he determines that such participation would be appropriate. Information on appropriate research and development programs will be available from the regional offices or from the Office of Research and Development.

§ 66.22 Contracting out penalty calculation.

Upon the failure of a source owner or operator, who does not submit a petition for reconsideration as provided in § 66.13(a)(2), to submit the information described in § 66.13(a)(1) within 45 days of receipt of a notice of noncompliance, or upon submission of incorrect information as determined pursuant to § 66.51, the Administrator may enter into a contract with any qualified person who is not an affiliated entity and who has no financial interest in the owner or operator of the source to assist in determining the amount of the penalty assessment or payment schedule with respect to such source owner or operator. The cost of this contract may be added to the penalty to be assessed against the owner or operator of the source. The data used in calculating the penalty shall be furnished to the source owner or operator at the time that the penalty calculation is reported.

§ 66.23 Interim recalculation of penalty.

(a) The Administrator, upon concluding that a previously approved penalty calculation no longer is accurate, may:

(1) Request, in writing, that the source owner or operator submit a revised calculation in the form specified in § 66.13(a). The Administrator shall respond to any information submitted in accordance with the provisions of § 66.51.

(2) Notify the source owner or operator, in writing, that the penalty has been recalculated based upon information in the Administrator's possession. The source owner or operator shall respond as provided in § 66.52.

(b) If a source owner or operator believes that, because of changed circumstances, a penalty calculation which has been accepted by EPA no longer is accurate, he may submit a revised penalty calculation and schedule to the Administrator. The revised calculation shall be in the form specified in subsection 66.13(a)(1). The Administrator shall respond in accordance with the provisions of subsection 66.51. The decision to accept the interim calculation or to grant a hearing on this issue shall be solely within the discretion of the Administrator.

Subpart D—Exemption Requests; Revocation of Exemptions

§ 66.31 Exemptions based on an order, extension or suspension.

(a) A source owner or operator who would otherwise be subject to a noncompliance penalty will be exempted from that penalty during the period for which, and upon a demonstration that, its noncompliance with applicable legal requirements is or was due solely to;

(a) A conversion by such source from the burning of petroleum products or natural gas, or both, as the permanent primary energy source to the burning of coal pursuant to an order under Section 113(d)(5) or Section 119 of the Act as in effect before August 7, 1977.

(2) In the case of a coal-burning source, the issuance of a prohibition to that source against burning petroleum products or natural gas, or both, by means of an order under Sections 2(a) and (b) of the Energy Supply and Environmental Coordination Act of 1974, the Powerplant and Industrial Fuel Use Act, or under any legislation which amends or supersedes these provisions, *Provided*, That the source had received an extension under the second sentence of Section 119(c)(1) of the Act as in effect before August 7, 1977.

(3) The use of innovative technology by the source owner or operator pursuant to an enforcement order under Section 113(d)(4) of the Act.

(4) An inability to comply with an applicable legal requirement resulting from reasons entirely beyond the control of the owner or operator of such source or of any affiliated entity, *Provided*, That (i) the source owner or operator has received an order under Section 113(d) (or an order under Section 113 issued before August 7, 1977) or a federal or EPA-approved State judicial decree or order which has the effect of permitting a delay in complying with the legal requirement at issue, and (ii) that the source owner or operator meets the requirements of subsections (c) and (d) of this section.

(5) The existence of an energy or employment emergency demonstrated by issuance of an order under Section 110(f) or 110(g) of the Act, unless such order is disapproved by EPA.

(b) To qualify for an exemption under this section, the source owner or operator must have received the order, extension or suspension or consent decree described in the paragraph of the subsection pursuant to which the exemption is claimed. No exemption may be sought which, if granted, would exceed the terms of the relevant extension, order, suspension, or consent decree, except as provided in subsection (e) below. No exemption may be sought which is based on a claim that the source owner or operator is entitled to any such order, extension, suspension, or consent decree even though it has not been issued.

(c) In any exemption claim based on paragraph (a) (4) above, the source owner or operator must demonstrate that the inability to comply resulted from one of the following situations:

(1) Act of God;

(2) Fire;

(3) Embargo;

(4) Strike;

(5) The inability to obtain capital necessary to finance the installation of pollution control equipment or the use of other control measures, to the extent that such inability resulted from temporary, verifiable, general market conditions;

(6) The verifiable and unforeseeable failure of pollution control equipment and associated process equipment to perform at reasonably anticipated design levels despite the best efforts of the source owner or operator in designing, operating and maintaining the control and process equipment or other emission control methods, provided that such efforts were reasonably calculated to achieve compliance; or

(7) The complete inability of a supplier or contractor to furnish labor or materials necessary to achieve compliance, provided the source owner or operator demonstrates:

(i) That the source owner or operator or an affiliated entity in no manner sought, caused, encouraged or contributed to the inability; and

(ii) That the source owner or operator in no way unduly delayed negotiation for needed equipment or fuel supply or made unusual demands not typical in its industry, or placed unusual restrictions on the supplier, or delayed in any other manner the delivery of goods or the completion of the necessary construction.

(d) (1) No exemption will be granted pursuant to subsection (a)(4) above unless the owner or operator of the source demonstrates that, with respect to a situation described in paragraph (c), all reasonable steps were taken to prevent the situation causing the inability to comply, that procuring the needed pollution control equipment or fuel supply was given and continues to be given the highest possible priority in the planning and budgeting process of the owner or operator of the source, and that alternative sources of equipment and fuel have been explored without success.

(2) Any exemption granted under subsection (a)(4) shall cease to be effective when the inability to comply ceases to be entirely beyond the control of the source owner or operator as defined in this section.

(e) Except in the case of exemptions based on orders under Section 113 (d)(4) or (d)(5) or suspensions under Section 110(g), the Administrator may grant an exemption with retroactive effect to the date of the event giving rise to the Section 120 predicate order, extension, suspension, or consent decree. In such cases, the exemption from the noncompliance penalty shall run from the date that the basis for the exemption first occurred.

§ 66.32 De Minimis exemptions.

(a) The Administrator may, upon notice and opportunity for public hearing, exempt the owner or operator of any source from a penalty where he finds that a particular instance of noncompliance was *de minimis* in nature and duration.

(b) A petition for an exemption on the ground that the violation described in a notice of noncompliance was *de minimis* in nature and duration may only raise issues related to entitlement to an exemption and shall contain or be accompanied by supporting documentation. Issues relating to entitlement to a *de minimis* exemption not raised in the petition shall be deemed waived.

(c) In ruling upon such a petition, the Administrator shall consider:

(1) The magnitude of the excess emissions and whether the source's noncompliance is recurring or persistent;

(2) The steps the source owner or operator is taking to eliminate the cause of the excess emissions and to minimize such emissions;

(3) Whether any significant economic savings are likely to accrue to the owner or operator of the source as a result of the noncompliance;

(4) The character of the emissions, and their impact on ambient air quality; and

(5) The duration of the violation.

(d) A hearing on a petition for a *de minimis* exemption shall be informal. The hearing shall be scheduled upon notice to the public. Reasonable opportunity to testify and for submission of questions by the public to the petitioner shall be afforded. The decision of the hearing officer will be made in writing within a reasonable period of time after the close of the hearing.

§ 66.33 De Minimis exemptions: malfunctions.

(a) The Administrator may, upon notice and opportunity for a public hearing, exempt the owner or operator of a source if he finds with respect to a particular instance of noncompliance, that such noncompliance was *de minimis* in nature and duration, and was caused solely by a sudden and unavoidable breakdown of process or pollution control equipment.

(b) A petition for an exemption on the ground that the violation was *de minimis* and was caused by a sudden and unavoidable breakdown of process

or pollution control equipment may only raise issues related to entitlement to an exemption and shall contain or be accompanied by supporting documentation. Issues relating to entitlement to an exemption that are not raised in the petition shall be deemed waived. In making such finding the Administrator shall consider whether:

(1) The violation was *de minimis* in nature and duration within the meaning of § 66.32;

(2) The air pollution control equipment, process equipment, or processes, including appropriate back-up systems, were designed, and have been maintained and operated in a manner consistent with good practice for minimizing emissions;

(3) Repair of the malfunctioning equipment was undertaken and carried out in an expeditious fashion as soon as the owner or operator knew or should have known that the malfunction existed or that applicable emission limitations were being violated or were likely to be violated;

(4) All practicable steps were taken to minimize the impact of the excess emissions (including any bypass) on ambient air quality;

(5) The excess emissions were not part of a pattern indicative of inadequate design, operation, or maintenance;

(6) Off-shift and overtime labor were utilized where necessary to ensure that repairs were made as expeditiously as possible or that emissions were minimized to the maximum extent possible; and

(7) The level of economic savings, if any, accruing to the source owner or operator was *de minimis*.

(c) Any activity that could have been foreseen, avoided or planned for, or any breakdown that could have been avoided by the exercise of reasonable diligence shall not constitute grounds for an exemption under this section. Such activities include, but are not limited to, sudden breakdowns avoidable by better maintenance procedures, phasing in and out of process equipment and routine maintenance.

(d) A hearing on any petition for an exemption based upon the unavoidable breakdown of pollution control equipment shall be informal. The hearing shall be scheduled upon notice to the public. Reasonable opportunity to testify and for submission of questions by the public to the petitioner shall be afforded. The decision of the hearing officer will be made in writing within a reasonable period of time after the close of the hearing.

§ 66.34 Termination of exemptions.

(a) Exemptions pursuant to subsections 66.31(a) (1), (2), (3), and (5) will cease to be for effective upon termination or revocation of the order on which the exemption is based.

(b) Exemptions pursuant to subsection 66.31(a)(4) will cease to be effective when the order or decree is terminated or revoked, or the inability to comply ceases to be for reasons entirely beyond the control of the source owner or operator as defined in subsection 66.31(c).

(c) Exemptions granted pursuant to §§ 66.32 or 66.33 shall terminate at the time specified in the exemption.

(d) The Administrator shall notify the source owner or operator, in writing, that the exemption has terminated, and shall specify the date from which the penalty shall be calculated. The notice shall be transmitted as required by § 66.12. The source owner or operator shall respond to this notice within 45 days of its receipt and in the form provided in subsection 66.13.

§ 66.35 Revocation of exemptions.

(a) The Administrator may upon notice and opportunity for a hearing revoke an exemption granted to the owner or operator of any source at any time in accordance with paragraphs (b) and (c) below.

(b) An exemption may be revoked and a penalty for the period of non-exempted noncompliance assessed if:

(1) The grounds for the exemption no longer exist or never did exist, or

(2) In the case of an exemption under § 66.31, the source owner or operator has failed to comply with any interim emission control requirements or schedules of compliance (including increments of progress) contained in the extension, order, suspension or EPA-approved consent decree on which the exemption was based.

(c) The Administrator shall provide the source owner or operator written notice containing the information required by § 66.12 and a statement of the reasons for revocation. The notice shall also specify the date from which the source owner or operator must calculate a penalty. The notice shall be transmitted as required by § 66.12. The source owner or operator shall respond to this notice within 45 days of its receipt and in the form provided in § 66.13.

Subpart E—Decisions on Exemption Requests and Challenges to Notices of Noncompliance

§ 66.41 Decision on petitions.

(a) Within thirty days after receiving a petition filed under § 66.13, the Administrator shall notify the source owner or operator in writing that:

(1) The petition demonstrates that the source owner or operator is entitled to part or all of the relief requested and that the notice of noncompliance is withdrawn or modified accordingly;

(2) The petition of the owner or operator of the source presents no information regarding the issues of whether the source is in violation of applicable legal requirements or is entitled to an exemption which, if true, would alter the liability of the source owner or operator, and that a hearing on the petition is denied;

(3) A hearing is granted on the issue of whether the source is in violation of applicable legal requirements or is entitled to an exemption under §§ 66.31, 66.32, 66.33, or on both;

(4) The information submitted is inadequate to enable EPA to determine whether the source owner or operator is entitled to the relief requested. The Administrator shall specify what deficiencies exist and request that the source owner or operator supplement his petition within thirty days of receipt of that request. If the petition is not supplemented adequately within this time, the Administrator may deny the relief requested. Any supplemental material provided pursuant to the Administrator's request shall be evaluated as provided in subsections (1)–(3) above.

(b) In granting any hearing pursuant to subsection (3), the Administrator may exclude particular fact questions from the hearing which do not qualify for a hearing under the criteria set forth in subsection (2).

§ 66.42 Procedure for hearings.

(a) Except as provided in §§ 66.32 and 66.33, hearings granted under § 66.41(a)(3) shall be held as provided in Subpart J.

(b) If hearings are granted pursuant to both §§ 66.32 or 66.33 and under Subpart J, a consolidated hearing in accordance with Subpart J shall be held. At the consolidated hearing the issues that would otherwise have been considered at a hearing under §§ 66.32 or 66.33 shall be considered pursuant to the procedures for a hearing provided in those sections.

(c) The Presiding Officer at a hearing granted under § 66.41 shall issue an initial decision within 90 days after the

Administrator grants the hearing, unless the duration of the hearing or the deadline for decision is extended by the Presiding Officer upon agreement of the parties. Failure to issue a decision (whether or not by consent) within 90 days shall not affect the validity of the proceedings or the accrual of penalties in any manner.

§ 66.43 Final decision; submission of penalty calculation.

Within forty-five days after EPA has notified the owner or operator of a source of the final Agency decision that it is in violation of applicable legal requirements or is not entitled to an exemption, the owner or operator shall submit the information required by § 66.13(a), including appropriate compliance and payment schedules and extra interest owed for the period of delay. The penalty shall be calculated from the date of receipt of the original notice of noncompliance.

Subpart F—Review of Penalty Calculation

§ 66.51 Action upon receipt of penalty calculation.

(a) Within thirty days after receipt of a penalty calculation provided pursuant to §§ 66.13(a)(1) or 66.43, the Administrator shall notify the source owner or operator in writing, that:

(1) The penalty is provisionally accepted as calculated, subject to any recalculation that may be necessary under § 66.72 after the source has achieved compliance; or

(2) The penalty is incorrect and has been recalculated based on the data provided by the source owner or operator, or other data. The Administrator shall provide a brief statement of the basis for the recalculation and shall identify when and where any supporting data may be examined. The Administrator shall also notify the source owner or operator of the right to petition for a hearing under § 66.52; or

(3) The source owner or operator has not submitted any calculation, or the information submitted is inadequate to enable EPA to verify the owner or operator's penalty calculation. The Administrator shall specify what deficiencies exist and request the source owner or operator to supplement his submission within thirty days of receipt of that request. If an inadequate supplemental submission is made within this time, EPA may calculate the penalty itself or as provided in § 66.22.

(b) Supplemental material provided pursuant to subsection (a)(3) of this section shall be evaluated as provided in paragraph (a).

§ 66.52 Petitions for reconsideration of calculation.

Within forty-five days after receipt of notice under § 66.51(a)(2) that the penalty has been recalculated by EPA, a source owner or operator who wishes to challenge EPA's recalculation shall petition in writing for reconsideration. A statement of all arguments on which the owner or operator relies, including all necessary supporting data and a substitute penalty calculation and payment schedule shall be included in or accompany this petition. Issues not raised in the petition shall be deemed waived.

§ 66.53 Decisions on petitions.

Within thirty days after receiving a petition for reconsideration under § 66.52 the Administrator shall:

(a) Accept the penalty calculation of the owner or operator to the extent the Administrator concludes it is correct; or

(b) Deny a hearing and affirm the calculation to the extent he concludes that the petition of the owner or operator does not present information which, if true, would alter the amount of the penalty; or

(c) Grant a hearing to the extent he concludes that the petition of the source owner or operator raises such questions.

§ 66.54 Procedures for hearing.

(a) Hearings granted under § 66.53 shall be held as provided in Subpart J.

(b) The Presiding Officer at a hearing granted under § 66.53 shall issue an initial decision within ninety days after the Administrator grants the hearing, unless the duration of the hearing or the deadline for decision is extended by the Presiding Officer upon agreement of the parties. Failure to issue a decision (whether or not by consent) within 90 days shall not affect the validity of the proceedings or the accrual of penalties in any manner.

Subpart G—Payment

§ 66.61 Duty to pay.

(a) Except where the owner or operator has submitted a petition pursuant to § 66.13(a)(2), the first installment of the penalty shall be paid on the date six months after receipt of the notice of noncompliance.

(b) Where the source owner has filed a petition pursuant to § 66.13(a)(2), the first installment consisting of payment of penalties for all quarters "missed" as well as for the upcoming quarter shall be paid on the date six months after a final administrative decision affirming the source owner or operator's liability. Installments shall be paid quarterly thereafter until compliance is achieved. Quarters shall be measured in increments of three calendar months from the date the first payment is due.

(c) A source owner or operator who submits a petition pursuant to § 66.52 shall pay the penalty amount calculated by the owner or operator under §§ 66.13 or 66.43 or any penalty calculated by EPA where the owner or operator has failed to calculate such penalty. Within 45 days after EPA has notified the owner or operator of a final administrative action after hearings on such petition, the owner or operator shall submit any necessary modification to the penalty. The revised penalty will be calculated in accordance with the Technical Support Document and the Manual, and a revised schedule, including appropriate adjustments for overpayments or underpayments made, will be established.

§ 66.62 Method of payment.

Payments in excess of $10,000 under this Part shall be made by wire transfer payable to the United States Treasury. Payments under this Part which are less than $10,000 shall be made by cashier's or certified check made payable to the United States Treasury, sent by registered mail, return receipt requested, and addressed to the Administrator, Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460. Payment by check is made on the due date if it is postmarked on or before the due date. Payment by wire transfer is made on the due date if the Treasury's account is credited on or before the due date.

§ 66.63 Nonpayment penalty.

(a) Any source owner or operator who fails to make timely payment under § 66.61 shall pay in addition to the penalty owed a quarterly nonpayment penalty. The nonpayment penalty shall be calculated as of the due date of the noncompliance penalty payment and shall be equal to 20 percent of the aggregate amount of the noncompliance penalties and nonpayment penalties due and owing from the owner or operator on the due date. Partial payments shall be credited first against the nonpayment penalty, then against the noncompliance penalty.

(b) The Administrator shall notify the source owner or operator in writing of the amount of any nonpayment penalty for which the owner or operator is liable. Failure of the Administrator to provide such notice immediately shall not affect the legal obligation of the source owner or operator to pay such penalty. Such nonpayment penalty, as

well as the past due noncompliance penalty, shall be payable immediately.

Subpart H—Compliance and Final Adjustment

§ 66.71 Determination of compliance.

(a) An owner or operator of a source who is paying a noncompliance penalty under this Part shall notify the Administrator in writing when he believes that the source has come into and is maintaining compliance with all applicable legal requirements. The notice shall be accompanied by any factual data, analytical materials, and legal arguments which the source owner or operator believes support such claim.

(b) Within 30 days of receipt of a source owner's submittal, the Administrator shall determine whether the source has achieved and is maintaining compliance with applicable legal requirements, and shall notify the source owner or operator of this determination in writing. If the Administrator is unable to conclude, on the basis of the information submitted, whether the source has achieved and is maintaining compliance with applicable legal requirements, he shall inform the owner or operator of any additional material that is needed. Within 30 days of receipt of such additional material, the Administrator shall determine whether the source has achieved and is maintaining compliance, and shall notify the source owner or operator of this determination in writing.

(c) If the Administrator determines that the source has not achieved or is not maintaining compliance with applicable legal requirements, the source owner or operator may petition for reconsideration within 30 days of receipt of the determination. The source owner or operator shall include in this petition any necessary supporting material. Issues not raised in the petition will be deemed waived. The procedures of § 66.41 shall be followed upon the receipt of such petition.

§ 66.72 Additional payment or reimbursement.

(a) Within 120 days after the source owner or operator receives notification pursuant to § 66.71(b) that it has achieved and is maintaining compliance with applicable legal requirements, or within 120 days after receipt of a decision to that effect upon petition and hearing, or within 120 days after receipt of a decision to that effect upon an appeal to the Administrator, the source owner or operator shall submit to the Administrator a revised penalty calculation as provided in the Technical Support Document and the Manual, together with data necessary for verification. The revised calculation shall include interest on any underpayment.

(b) Within thirty days after receiving a revised penalty calculation provided pursuant to paragraph (a), the Administrator shall inform the source owner or operator in writing that:

(1) The revised penalty is correct as calculated;

(2) The revised penalty is incorrect and has been recalculated based on the data provided by the source owner or operator or on other data. The Administrator shall provide to the source owner or operator a brief statement of the basis of the recalculation and shall identify when and where any supporting data may be examined. The Administrator shall also notify the source owner or operator of the right to petition for reconsideration under § 66.73; or

(3) The source owner or operator has not submitted any penalty calculation, or has not submitted enough material to enable EPA to verify the penalty calculation. The Administrator shall specify what deficiencies exist and shall require the source owner or operator to furnish the supplemental material within thirty days of receipt of the notice. The supplemental material submitted will be evaluated in the same manner as the original submittal.

(c) If a source owner or operator fails to submit or to complete a revised penalty calculation when due under this section or the calculation submitted is incorrect, the Administrator may recalculate the penalty or may enter into a contract for independent calculation of the penalty as provided in § 66.22.

§ 66.73 Petition for reconsideration and procedure for hearing.

Within forty-five days of receipt of a notice under § 66.72(b) (2) a source owner or operator may petition for reconsideration in the form and manner provided in § 66.52. The petition shall be evaluated as provided in § 66.53 and any hearing shall be held in conformity with § 66.54.

§ 66.74 Payment or reimbursement.

(a) Within thirty days after any adjustment of a noncompliance penalty under this Subpart has become administratively final:

(1) Any deficiency owed by the source owner or operator shall be paid as provided in § 66.62.

(2) Any reimbursement shall be paid by check from the United States payable to the order of the source owner or operator, and sent by registered or certified mail, return receipt requested.

(b) Any payment under paragraph (a) shall include interest on the amount of the deficiency or reimbursement due, from the date the deficiency or reimbursement arose, at a rate determined by the Secretary of the Treasury. Such payment shall be calculated in accordance with the Technical Support Document and the Manual.

(c) Any source owner or operator who fails to make timely payment of a deficiency shall pay a nonpayment penalty. The nonpayment penalty shall be calculated as of the due date of the deficiency payment and shall be equal to 20% of the deficiency not paid. Such nonpayment penalty (in addition to the amount of the deficiency owed) shall be payable immediately. If any part of the nonpayment penalty or deficiency shall remain unpaid at the end of three calendar months from the due date of the deficiency, a further nonpayment penalty shall be due equal to 20% of the sum of all payments due and owing. Partial payments shall be credited first against the nonpayment penalty, then the deficiency.

Subpart I—Final Action

§ 66.81 Final action.

(a) A final Agency action appealable to the courts by the source owner or operator includes and is limited to the following, provided the conditions of paragraph (b) are met:

(1) A notice of determination that a source is in violation of applicable legal requirements;

(2) A notice of decision to deny or revoke an exemption under Subpart D;

(3) A notice of revision by EPA of a penalty calculation or schedule under Subpart F;

(4) A notice of decision by EPA that the source is not in final compliance or any revision by EPA of a final penalty calculation under Subpart H; and

(5) A notice of denial of a petition for reconsideration under §§ 66.41, 66.53, 66.71 or 66.73.

(6) A decision by the Administrator upon completion of any review of a State action pursuant to Part 67.

(b) The actions listed in paragraph (a) constitute final Agency action only if all administrative remedies have been exhausted. To exhaust administrative remedies a source owner or operator must first petition for reconsideration of the decision in question and, if unsuccessful after hearing or after denial of hearing, appeal the decision in question to the Administrator. The action becomes final upon the completion of review by the

Administrator and notice thereof to the owner or operator of the source.

(c) Where a petition seeks reconsideration both of the finding of noncompliance and of the finding of liability on the ground that the source owner or operator is entitled to an exemption, both questions must be decided before any review by the Administrator is sought, except on agreement of the parties.

Subpart J—Supplemental Rules for Formal Adjudicatory Hearings

§ 66.91 Applicability of supplemental rules.

The Supplemental Rules in this subpart, in conjunction with the Consolidated Rules of Practice (40 CFR Part 22) shall govern all hearings held under this Part. To the extent that the provisions of these Supplemental Rules or any other provision of this Part are inconsistent with the Consolidated Rules, the provisions of this Part shall govern.

§ 66.92 Commencement of hearings.

(a) The provisions of 40 CFR 22.08 (Consolidated Rules of Practice) shall become applicable when the Administrator grants a hearing.

(b) Upon granting a hearing the Administrator shall immediately transmit to the appropriate Regional Hearing Clerk two copies of the notice granting the hearing and:

(1) In the case of a hearing pursuant to § 66.42, two copies of the notice of noncompliance under Section 66.11 (or the revocation notice under § 66.34) and of the petition of the owner or operator under § 66.13, together with supporting documents; and

(2) In the case of a hearing pursuant to § 66.53 or § 66.73, two copies of the penalty calculation of the source owner or operator provided pursuant to § 66.13(a) or § 66.72, and of any Agency recalculation pursuant to Section 66.51(a)(2) or 66.72(b)(2), and of the petition of the source owner or operator for reconsideration pursuant to §§ 66.52 or 66.73, together with supporting documents.

(3) The Regional Hearing Clerk shall open and maintain the official file of the proceeding upon receipt of the documents referred to in subparagraphs (1) and (2) above.

(c) Upon granting a hearing the Administrator shall request the Chief Administrative Law Judge to designate an Administrative Law Judge to serve as the Presiding Officer. The Chief Administrative Law Judge shall make this designation within seven days of receiving the request, and shall notify the Regional Hearing Clerk of his action. The Regional Hearing Clerk shall forward to the Presiding Officer one set of the documents described in paragraph (b).

§ 66.93 Time limits.

The Presiding Officer upon designation shall notify the parties and shall, if appropriate, schedule a prehearing conference (or alternative procedures) under 40 CFR 22.19 and shall notify the parties of the date of hearing under 40 CFR 22.21. The Presiding Officer shall issue an initial decision no later than ninety days after the hearing is granted, unless an extension of the hearing schedule or of the deadline for decision is agreed to by the parties. To that end, the Presiding Officer may establish such deadlines as are reasonable and necessary. Failure to issue a decision withing 90 days or further extended deadline (whether or not by consent) shall not affect the validity of the proceedings.

§ 66.94 Presentation of evidence.

(a) In hearings pursuant to § 66.42 EPA shall present evidence of violation of applicable legal requirements. The source owner or operator shall then present any rebuttal evidence.

(b) In hearings under Section 66.42 the source owner or operator shall present evidence of entitlement to an exemption. EPA shall then present any rebuttal evidence.

(c) In hearings under §§ 66.54 and 66.73 EPA shall present evidence that its calculation or revisions of the source owner or operator's penalty calculations are correct. The source owner or operator shall then present any rebuttal evidence.

(d) Each matter of controversy shall be determined by the Presiding Officer upon a preponderance of the evidence.

(e) Any documentation submitted pursuant to § 66.92(b) shall automatically be received into evidence in the hearing.

§ 66.95 Decisions of the Presiding Officer; Appeal to the Administrator.

(a) The Presiding Officer shall dispose of the issues raised in the hearing in a single written decision. Such decision shall terminate the Presiding Officer's consideration of those issues.

(b) Penalty calculations and payment schedules, if any, established by the decision of the Presiding Officer shall be based solely on the parameters, terms and conditions of the Technical Support Document, Manual, and Computer Program.

(c) An appeal to the Administrator from a decision of the Presiding Officer shall be made by petition filed within twenty (20) days from receipt by a party of the Presiding Officer's decision. The Administrator shall rule on the appeal within 30 days of receipt of a petition. No appeal may be made before receipt of the decision of the Presiding Officer.

Appendix A—Technical Support Document

Note.—For text of Appendix A see Appendix A to Part 67.

Appendix B—Instruction Manual

Note.—For text of Appendix B see Appendix B to Part 67.

Appendix C—Computer Program

Note.—For text of Appendix C see Appendix C to Part 67.

PART 67—EPA APPROVAL OF STATE NONCOMPLIANCE PENALTY PROGRAM

Subpart A—Purpose and Scope

Sec.

67.1 Purpose and scope.

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Appendix A—Technical Support Document.
Appendix B—Instruction Manual.
Appendix C—Computer Program.

Authority: Section 120 of the Clean Air Act, as amended, 42 U.S.C. 7420.

Subpart A—Purpose and Scope

§ 67.1 Purpose and scope.

This Part describes the standards and procedures under which EPA will approve State programs for administering the noncompliance penalty program under Section 120 of the Clean Air Act and will evaluate actions taken by States with approved

programs. Subpart A describes the purpose of the Part. Subpart B states the conditions under which EPA will approve State programs to administer the noncompliance penalty provisions. Subparts C and D state when and how EPA will issue its own notices to owners or operators of sources in States with approved programs, and how it will review State decisions to grant or deny exemptions from the penalty. Finally, Subpart E states how EPA will review State assessments of a penalty.

Subpart B—Approval of State Programs

§ 67.11 Standards for approval of State programs.

(a) The Administrator shall approve any program submitted by a State, or by a local governmental agency where no program has been submitted by a State, for administering the noncompliance penalty provisions of Section 120 of the Clean Air Act upon finding that the program conforms to the requirements of the Act and to those of this Part and 40 CFR Part 66. References to "State program" in this Part shall be read as including local governmental agencies and their programs.

(b) The Administrator shall not approve any State program that does not provide explicitly for:

(1) Issuance of a notice of noncompliance, in a manner consistent with procedures under Part 66, upon discovery by the State or upon notification by EPA of a violation of applicable legal requirements, which notice satisfies the informational requirements set forth in Section 66.13.

(2) Levels of staffing and funding satisfactory, in the judgment of the Administrator, to implement and enforce the requirements of Section 120 in that State, together with adequate provision for maintaining such levels;

(3) A capability to carry out the financial analysis and procedures specified in these regulations and the Technical Support Document and Instruction Manual, together with adequate provision for maintaining such capability. Such capability may be provided by trained State personnel or through qualified contractors;

(4) Except as provided in paragraph (6), an administrative hearing whenever the owner or operator of a source submits a petition for reconsideration of a notice of noncompliance on the ground that the source either is not in violation of applicable legal requirements, or is entitled to an exemption, or both, or submits a petition to challenge a recalculation of the penalty by the State, provided that such petitions raise issues of fact that would require a hearing under Part 66. This hearing need not conform to the requirements of 5 U.S.C. 554 as long as its procedures provide for:

(i) An initial decision by the hearing officer on the record;

(ii) A hearing officer who has not performed investigative or litigating functions in any enforcement action against the source owner or operator in question;

(iii) Opportunity for public participation on reasonable notice, including intervention, by interested persons;

(iv) Opportunity for cross-examination or an equivalent opportunity for confrontation between persons advocating differing positions on material factual matters; and

(v) An initial decision by the hearing officer within ninety days of commencement of the hearing unless such period is extended upon agreement of the parties.

(5) Explicit provision for:

(i) notice to the Administrator of any determination granting an exemption, or finding a source in violation of applicable legal requirements, and any penalty calculation and payment schedule approved or calculated by the State, together with any information necessary to verify its accuracy;

(ii) within 30 days of receipt of a request from the Administrator, transmission of a copy of the record of the hearing held under paragraphs (4) or (6) of this subsection, including any proffered evidence and a ruling on its admissibility and the State's decision on the merits; and

(iii) additional reporting and record keeping, if necessary, adequate to enable the Administrator to review the State's administration of the program and determine whether it conforms to the Act and to Part 66 of these regulations. Such requirements will be specified in the Notice of Delegation to the State.

(6) A hearing on the question of whether the owner or operator of a source is entitled to an exemption pursuant to §§ 66.32 or 66.33 may be informal. The hearing shall be scheduled upon notice to the public. Reasonable opportunity to testify and for submission of questions to the petitioner by members of the public shall be afforded. A record of the hearing shall be made, and the decision of the hearing officer made in writing within a reasonable period of time after the close of the hearing.

(c) The State may delegate all or part of its responsibilities under its program to a local governmental agency to implement the program within the jurisdiction of the local agency, *Provided* that the program of the local government agency meets the requirements of this section.

(d) No State penalty program or program of one of its agents shall be disapproved because it is more stringent than the program established by Part 66 or by Section 120 where the State or local agent concludes that it has independent authority under State or local law to implement and administer the more stringent portions of the program.

§ 67.12 Application for approval of programs.

A state that wishes to administer a Section 120 program shall submit an application in writing to the Administrator describing its proposed program. All necessary supporting materials shall accompany the application.

§ 67.13 Approval.

(a) The Administrator shall evaluate any application submitted under § 67.12 and shall:

(1) Approve the program and delegate authority to the State to administer the program if he determines that the requirements of § 67.11 have been and will be met; or

(2) Request additional information if he determines that the information submitted is not sufficient to allow him to determine whether the requirements of § 67.11 have been and will be met; or

(3) Disapprove the State program if he determines that the information submitted establishes that the requirements of § 67.11 have not been or will not be met.

(b) The Administrator shall notify the State in writing of his action under subsection (a) and shall state the reasons for his action.

(c) In all cases of delegation (whether or not express provision is made in the notice of delegation) the Administrator shall retain continuing authority to issue notices of noncompliance, review exemption requests or penalty calculations, or take any other steps set forth in Part 66 to assess and collect these penalties. Such authority shall be exercised pursuant to the provisions of § 67.21.

(d) The Administrator shall retain exclusive authority to assess and collect penalties against source owners or operators of facilities in the State who were issued notices of noncompliance pursuant to Part 66 prior to the effective date of the delegation, except to the extent the Administrator specifically delegates such authority to the State.

§ 67.14 Amendments to the program.

A State or local agent with a program approved pursuant to § 67.13 may propose amendments to that program to the Administrator. The Administrator shall evaluate whether the State or local agent's program as amended would conform to the requirements of § 67.11 and shall respond as provided in § 67.13.

§ 67.15 Revocation.

If the Administrator determines that a State with a program approved under § 67.13 is not administering the program in conformity with the requirements of the Act or § 67.11, or the delegation of authority, he shall provide the State written notice of that determination, setting forth his reasons. Copies of all supporting materials shall accompany the notice if requested, or shall be placed on file in the appropriate Regional Office and made available for inspection during normal business hours. The State shall have 90 days in which to respond in writing to this determination. If the Administrator finds after reviewing the State response that (i) the State is in fact administering the program in conformity with § 67.11, or (ii) there are reasonable grounds to believe the State program will immediately be brought into conformity with that section, he shall withdraw his determination. If he finds that neither of these conditions has been met, he shall withdraw the delegation of authority to the State.

Subpart C—Federal Notice of Noncompliance to Sources in States With Approved Programs

§ 67.21 Federal notice of noncompliance to owners or operators of sources in States with approved programs.

(a) The Administrator shall issue a notice of noncompliance to the owner or operator of any source in a State with an approved program if he determines that the State or its local agent has failed to issue such notice, provided that he shall first give 30 days notice to the State of his intent to issue a notice of noncompliance to the owner or operator of the source in question unless the State or its agent does so first. Any notice issued by the Administrator pursuant to this section shall be deemed to be issued pursuant to the provisions of Part 66.

(b) The issuance of a notice of noncompliance shall operate to withdraw EPA delegation of authority to the State with respect to the particular facility in question.

(c) If the Administrator determines that the State or local agent has issued a notice of noncompliance but has failed to pursue diligently subsequent steps for the assessment and collection of the penalty, he shall notify the State of his intent to withdraw delegation of authority to the State with respect to the facility in question and take appropriate actions pursuant to Part 66 unless the State or local agent, within 30 days, takes appropriate action in accordance with the requirements of this Part. In either case the penalty will be calculated from the date of the State notice.

Subpart D—EPA Review of State Compliance or Exemption Decisions

§ 67.31 Review by the Administrator.

(a) The Administrator may, on his own initiative, review any determination by a State or its agent that a source owner or operator is or is not in compliance with applicable legal requirements or is or is not entitled to an exemption, to determine whether that determination conforms to the requirements of the Act and Part 66 (as modified by § 67.11).

(b) The Administrator shall review any such determination upon receipt of a petition alleging that the State's determination does not conform to the requirements of the Act and Part 66 (as modified by § 67.11). Such petition must be filed within 20 days of issuance of the State's decision.

(c) The Administrator shall give notice in writing to the State or local agent, to the owner or operator of the source, and to the petitioner of his intent to review the determination. Such notice shall be given within 90 days of the Administrator's receipt of the State or local agent's determination. Unless otherwise provided, such notice shall not withdraw EPA's delegation of authority to the State or local agent over the particular facility in question.

(d) No such State determination shall become final until the expiration of 90 days after the Administrator's receipt of the notice required by § 67.11(b)(5).

(1) If the Administrator does not issue a notice of intent to review within that period, the State determination shall, upon expiration of such period, constitute final action of the Administrator under Section 120 of the Act.

(2) If the Administrator issues a notice of intent to review within that period, the State determination shall not become final until the Administrator takes final action after reviewing the determination.

(e) Except as otherwise provided, a State determination shall be approved if there was a reasonable basis in law and in fact for making the determination.

§ 67.32 Procedure where no formal State hearing was held.

(a) In reviewing a decision that a source is in compliance with applicable legal requirements or entitled to an exemption for which no hearing conforming to § 67.11(b) (4) or (6) was held, the Administrator shall evaluate the accuracy and adequacy of the documents transmitted to him pursuant to § 67.11(b)(5) and shall invite submission of comments on issues identified by him as relevant to his review.

(b) If the Administrator concludes that no hearing need have been held and that the State determination was correct, he shall notify the State, the source owner or operator, and other participants of his determination, which shall constitute final agency action by EPA under authority of section 120. If the Administrator concludes that the petition of the source owner or operator presented information which, if true, would have altered the owner or operator's liability for a penalty, he shall upon notice to the State or local agent schedule a hearing in accordance with subpart E of Part 66. Such notice shall operate as a withdrawal of EPA's delegation of authority to the State or local agent over the facility in question unless the State or local agent schedules a hearing within 15 days of receipt of the notice.

(c) If the Administrator concludes that the State determination did not conform to the requirements of the Act or of Part 66 (as modified by Section 67.11), he shall by written notice revoke the determination. Such revocation shall operate as a withdrawal of EPA's delegation of authority to the State or local agent over the facility in question. The source owner or operator may then petition for review of the Administrator's decision pursuant to the provisions of Section 66.13.

(d) Unless otherwise provided in the Administrator's notice to the State or local agent, any noncompliance penalties owed by the source owner or operator shall be paid to the State or local agent. The Administrator shall send a copy of this notice to the source owner or operator.

§ 67.33 Procedure where a formal State hearing was held.

(a) In reviewing a decision that a source is in compliance with applicable legal requirements or is entitled to an exemption for which a hearing conforming to § 67.11(b) (4) or (6) was held, the Administrator may invite comment on issues identified by him as relevant to his review and shall propose or make findings as to the correctness of

the determination and the accuracy and adequacy of the material transmitted pursuant to § 67.11(b)(5).

(b) The Administrator shall notify all participants in the State hearing of his findings and conclusions. If the Administrator concludes that the State determination conformed to the requirements of the Act and of Part 66 (as modified by § 66.11), the Administrator's determination shall constitute final administrative action by EPA under authority of Section 120. If the Administrator finds that the State determination did not conform to the requirements of the Act and of part 66 (as modified by § 67.11), the findings shall constitute proposed findings and the notice shall invite participants to file exceptions thereto. If the Administrator considers it desirable, he may schedule a time for argument.

(c) Within 60 days of receipt of any briefs or exceptions or after oral argument pursuant to subsection (b), the Administrator shall affirm, modify, or revoke his proposed findings that the State's determination did not conform to the requirements of the Act or of Part 66 (as modified by § 67.11). The decision shall be in writing. Notice and a copy of the decision shall be provided to the source owner or operator and to all other participants in the State hearing. The decision shall constitute a final administrative action by EPA under authority of Section 120.

(d) If the Administrator finds that deficiencies in the hearing record prevent him from determining whether the determination of the State or local agent conformed to the requirements of the Act and Part 66 (as modified by § 67.11), he shall notify the State or local agent of his finding and specify what deficiencies exist and schedule a hearing pursuant to Subpart E of Part 66. Such notice shall operate as a withdrawal of EPA's delegation of authority to the State or local agent over the facility in question unless the State or local agent schedules a supplemental hearing to correct the deficiencies within 15 days of receipt of the notice.

(e) If the Administrator concludes that the source is in violation of applicable legal requirements or is not entitled to an exemption, or both, and unless otherwise ordered in the decision, the source owner or operator shall submit a penalty calculation to the State within 45 days of receipt of the notice of determination.

Subpart E—EPA Review of State Penalty Assessments

§ 67.41 When EPA may review.

(a) The Administrator may on his own initiative or on petition review any initial, interim, or final penalty calculation made or approved by the State or local agent to determine whether it conforms to the requirements of the Act, of Part 66, of the Technical Support Document and the Instruction Manual. The Administrator shall notify the State or local agent in writing of his intention to review the calculation within 60 days of receipt by EPA of the calculation or any item considered by the State in making or approving such calculation, whichever occurs later.

(b) No such State determination shall become final until the expiration of 90 days after the Administrator's receipt of the notice required by § 67.11(b)(5).

(1) If the Administrator does not issue a notice of intent to review within that period, the State determination shall, upon expiration of such period, constitute final action of the Administrator under Section 120 of the Act.

(2) If the Administrator issues a notice of intent to review within that period, the State determination shall not become final until the Administrator takes final action after reviewing the determination.

(c) Except as otherwise provided, a State determination shall be approved if there was a reasonable basis in law and in fact for making the determination.

§ 67.42 Procedure where no formal State hearing was held.

(a) In reviewing a penalty calculation for which no hearing conforming to the requirements of Subsection 67.11(b)(4) was held, the Administrator shall evaluate the accuracy and adequacy of the data contained in the documents transmitted to him pursuant to Section 67.11(b)(5) and shall invite comments on issues identified by him as relevant to his review.

(b) If the Administrator concludes that no hearing need have been held and that the State determination was correct, he shall notify the State, the source owner or operator, and other participants of his determination, which shall constitute final agency action by EPA under authority of Section 120. If the Administrator concludes that the petition of the source owner or operator for reconsideration of a recalculation presented information which, if true, would have altered the amount of the penalty calculated, he shall upon notice to the State schedule a hearing in accordance with subpart F of Part 66. Such notice shall operate as a withdrawal of EPA's delegation of authority to the State or local agent over the facility in question unless the State or local agent schedules a hearing within 15 days of receipt of the notice.

(c) If the Administrator concludes that the determination of the State or local agent not to hold a hearing was proper but that the penalty calculation does not conform to the requirements of the Act or of Part 66, he shall by written notice revoke the determination and issue a notice of recalculation to the source owner or operator pursuant to § 66.51. A copy of the notice of recalculation shall be provided to the State or local agent. The notice of recalculation shall constitute final administrative action by EPA under authority of Section 120 unless the source owner or operator petitions for reconsideration under § 66.52, in which case it shall operate as a withdrawal by EPA of its delegation of authority to the State or local agent over the facility in question.

(d) Unless otherwise provided in the Administrator's notice, noncompliance penalties finally determined to be owed shall be paid to the State or local agent.

§ 67.43 Procedure where a formal State hearing was held.

(a) In reviewing a penalty calculation for which a hearing conforming to § 67.11(b)(4) was held, the Administrator may invite comment on issues identified by him as relevant to his review and shall propose or make findings as to the correctness of the determination and shall evaluate the accuracy and adequacy of the material transmitted pursuant to § 67.11(b)(5).

(b) The Administrator shall notify all participants in the State hearing of his findings and conclusions. If the Administrator finds that the State determination conformed to the requirements of the Act, Part 66 (as modified by § 67.11), the Technical Support Document, and the Instruction Manual, his determination shall constitute a final action pursuant to Section 120. If the Administrator finds that the State determination did not conform to the requirements of the Act or of Part 66 (as modified by § 67.11) or to the Technical Support Document or Instruction Manual, the findings shall constitute proposed findings, and the notice shall invite participants to file exceptions to his proposed findings and, if necessary, schedule a time for argument.

(c) Within 60 days of receipt of any briefs or exceptions or after oral argument, the Administrator shall affirm, modify, or revoke his proposed findings that the State or local agent's

determination did not conform to the requirements of the Act or of Part 66 (as modified by § 67.11) or the Technical Support Document or Instruction Manual. The decision shall be in writing. Notice and a copy of the decision, which shall constitute final administrative action by EPA pursuant to Section 120, shall be provided to the source owner or operator and to all other participants in the State hearing.

(d) If the Administrator finds that deficiencies in the State or local agent's hearing record prevent him from determining whether the State or local agent's determination conformed to the requirements of the Act and Part 66 (as modified by § 67.11) or the Technical Support Document or Instruction Manual, he shall notify the State or local agent of his decision and specify what dificiencies exist and schedule a hearing in accordance with Subpart F of Part 66. Such notice shall operate to withdraw EPA's delegation of authority to the State or local agent over the facility in question unless the State or local agent within 15 days schedules a supplemental hearing to correct the deficiencies.

(e) Unless otherwise provided in the Administrator's notice to the State or local agent, any noncompliance penalties owed by the source owner or operator shall be paid to the State or local agent.

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APPENDIX A

CLEAN AIR ACT

SECTION 120

NONCOMPLIANCE PENALTIES

TECHNICAL SUPPORT DOCUMENT

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SECTION I

INTRODUCTION AND SUMMARY

The decision to install pollution control equipment implies a decision to commit financial resources, both initially in the form of capital investment and over time in the form of operating and maintenance expenses. While the acquisition of such equipment and its operation may result in improved environmental quality, it is unlikely to yield any direct economic benefit to the firm. If these financial resources were not required for pollution control equipment, they presumably would be invested in projects which would give a direct economic benefit to the firm. Thus, from a economic point of view, it is usually in the firm's interest to delay the commitment of funds for the purchase and operation of pollution control equipment.

Congress acted in 1977 to remove this incentive for noncompliance. The Clean Air Act ("the Act") was amended to require the imposition of penalties against firms not in compliance with pollution control regulations. These penalties must be based on the savings which accrue to a firm as a result of its noncompliance. Section 120(d)(2) of the Act states:

> "The amount of the penalty which shall be assessed and collected with respect to any source under this section shall be equal to--
>
> (A) the amount determined...which is no less than the economic value which a delay in compliance beyond July 1, 1979, may have for the owner of such source, including the quarterly equivalent of the capital costs of compliance and debt service over a normal amortization period, not to exceed ten years, operation and maintenance costs foregone as a result of noncompliance, and any additional economic value which such a delay may have for the owner or operator of such source."

The Administrator of the Environmental Protection Agency (EPA) is given responsibility for carrying out this provision. This appendix describes the economic basis and the mathematical formulation of a noncompliance penalty to be used in conforming with the requirements set forth in the Act. It is intended to serve three distinct purposes. First, it presents in broad, conceptual terms the nature of economic savings which can accrue to a firm through delayed compliance and the calculation of a penalty to remove those savings. Second, it provides a mathematical formulation of the noncompliance penalty and the assumptions used in deriving it. Finally, it provides a complete specification of the sources of all the data needed to calculate the penalty for a particular incidence of noncompliance.

This appendix is not intended to serve as an instruction manual for persons calculating noncompliance penalties. A separate appendix issued by EPA serves that purpose.[1]

THE VALUE OF DELAY

For the purposes of noncompliance penalties, the economic value, or savings, from noncompliance is defined to have two components: (1) the return which can be earned on the capital costs of pollution control equipment whose purchase has been delayed, and (2) the operating and maintenance costs avoided as a result of not having installed the equipment and the return on these savings. The first component, the capital cost savings, arises because owners of noncomplying sources have the opportunity to invest their funds in projects other than pollution control equipment during the period of delay. These other investments yield a monetary return during the period of delay and in the future equal to the firm's marginal return on capital; whereas, the purchase of pollution control equipment typically yields no direct monetary return. Thus a delay in compliance creates the

[1] Appendix B, Clean Air Act Section 120 Noncompliance Penalties, Instruction Manual.

opportunity for the owner of such sources to benefit by the amount of earnings which could be expected from alternative investments.

The second component of savings from delayed compliance is based on the operating and maintenance costs which would be incurred if the pollution control equipment were installed. These include the costs of labor, raw materials, energy and any other expenditures directly associated with the operation of the pollution control equipment. Unlike capital expenditures which are only delayed, delaying compliance allows these operating and maintenance expenditures to be avoided altogether and therefore the noncomplying firm benefits by their amounts in addition to the return that can be earned on these savings.

THE NONCOMPLIANCE PENALTY

The two components of economic savings can be quantified using generally accepted economic and financial principles and estimates of such factors as equipment costs, financing costs, the inflation rate, and the length of the delay. These same techniques can then be employed to convert the savings into the basis for a penalty. As part of that conversion, an adjustment is made to incorporate the effect of capital and operating expenditures made after a notice of noncompliance has been given but prior to the time at which full compliance is achieved. The resulting penalty schedule appears as a series of quarterly payments which increase with inflation.

As implied above, the calculation of the penalty requires estimates of capital and operating costs, the rate of return on equity capital, and the inflation rate. Because these estimates are often made well in advance of the actual expenditures, they are subject to error. Once compliance has been achieved the capital cost is known and a better estimate of the operating and maintenance costs may be possible. More current estimates of the rate of return on equity capital and the inflation rate are also possible since more recent data on the rates will become available during the period of noncompliance. The Act calls for a recalculation of the penalty using these revised figures. A refund will then be paid or additional penalty payment assessed based on the new estimate of economic savings.

PLAN OF THIS APPENDIX

Following the introductory section, Section II contains a discussion of the legal and economic rationale for the procedures which have been adopted for calculating the penalty. Although an attempt has been made to present the discussion in such a way that it can be understood by persons not familiar with this subject, the need to keep intact the integrity of the underlying financial theory requires that the discussion remain somewhat technical.

Section III contains a summary of the assumptions used in deriving the formulae and the reasons for adopting these assumptions. Section IV defines the various parameters included in the formulae and the sources which should be used to acquire the data needed to calculate the penalty in specific cases.

Finally, Section V presents the development of the formulae needed to compute the noncompliance penalty. The attachments describe the treatment of certain cases which require adjustment of either the data or the formulae.

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SECTION II

ECONOMIC SAVINGS AND THE NONCOMPLIANCE PENALTY

The costs associated with controlling pollution arise from many sources. The most apparent are the original purchase cost of the control equipment and the annual operating and maintenance expenditures. There may also be costs associated with the financing of the original purchase; for example, interest would be paid if a portion were financed with borrowed funds.

In addition to the direct costs, other financial impacts result from the purchase of equipment. Depreciation, for example, has the effect of reducing income tax liability in years subsequent to the original investment. Similarly, the original purchase may result in an investment tax credit, acting much the same as if a discount were given on the purchase price. Both of these have the effect of lowering the net cost to the firm.[1]

To calculate the economic value to a firm from delaying compliance with pollution control regulations, it is necessary to evaluate on a consistent basis the effect of all costs avoided or delayed, and related tax consequences, between the date by which compliance is required and the date on which compliance actually occurs. Because the various savings do not all occur at the same time, they must first be converted into values which are comparable with respect to the time-value of money (that is, the sooner a savings is generated, the more valuable it is). This conversion is accomplished by discounting all estimated future savings into their "present value" equivalents, a technique described below. Finally, the sum of the discounted values must be converted into series of level quarterly penalty payments as prescribed by the Act.

[1]The term "firm" will be used to designate the owner of the pollution source. The discussion is equally applicable to sources owned by individuals.

This section describes the process of translating the estimated costs and tax consequences associated with the purchase and operation of pollution control equipment into a penalty. That penalty reflects the savings that a firm realizes by delaying its compliance with pollution control regulations.

POLLUTION CONTROL CASH FLOWS

The above discussion of the financial impact of delaying an investment in pollution control equipment was expressed in terms of costs, net of related tax consequences. A question arises as to the appropriate metric with which to measure these costs. The financial literature is clear on this subject: the appropriate metric is the incremental cash flow, positive or negative, associated with each cost.[1]

In order to measure each incremental cash flow properly, account must be taken not only of the initial effect but also of any offsetting tax effects. Available tax deductions can reduce the amount of income otherwise taxable and tax credits can reduce the amount of tax otherwise payable. These tax effects reduce the cash flow impact of an investment in pollution control equipment since they reduce the amount of tax payable in the presence of such expenditures. For example, payments for operations and maintenance are tax deductible. Therefore, the incremental cash flow resulting from such payments consists of the initial expense less any reduction in tax liability. For most corporations this means that the net cash flow resulting from tax deductible payments will usually be approximately one-half of the stated pre-tax cost.

[1]See, for example, Weston, J.F. and Brigham, E.F., Managerial Finance, The Dryden Press, Hinsdale, Illinois, 1975, pp. 275-281, or Van Horne, R.C., Financial Management and Policy, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1974, pp. 78-81.

There are three categories of cash flow arising from the purchase and operation of pollution control equipment. These are: (1) the initial capital outlay required to purchase and install equipment; (2) the subsequent monthly flows associated with depreciation and financing of the initial capital outlay; and (3) the subsequent monthly expenses of operating and maintaining the equipment. The first category is equal to the cost of purchasing or constructing the equipment, less the amount of any applicable investment tax credit. The investment tax credit constitutes a reduction in tax liability which has the effect of a discount on the purchase price. The second category of cash flow includes the tax shield from depreciation and interest as well as principal payments on debt and preferred stock. The third category is equal to expenditures for operation and maintenance less the applicable tax deductions. All of these cash flows are repeated when the equipment is replaced at the end of its useful life.

DISCOUNTING OF CASH FLOWS

Once all incremental cash flows have been estimated, they must be converted into a set of values which reflect the timing of their occurrence. This procedure is necessary because two cash flows of equal dollar value occurring many years apart do not have equal impact on the firm. This differential arises because the firm can invest funds at some positive rate of return. If a dollar of expenditure can be postponed for one year, that dollar can be invested in the interim. At the end of the year the dollar of expenditure can be made and the return on the investment during the intervening period accrues to the benefit of the firm.

The technique used to compensate for this effect is called discounting. Discounting involves reducing the value of future cash flows to amounts which are equivalent in terms of

their present value. As an example, suppose that a firm faced with a $100 expenditure could delay that expenditure by one year (assume no inflation). If the firm could invest money for that year at a 10 percent return, it would not need to put aside a full $100 to make the payment one year later. In fact, if it invested only $90.91 at a 10 percent return, that amount would grow to $100 in one year. Therefore, $90.91 is the present value, at 10 percent, of a $100 cash flow one year in the future.

Similarly, $82.64 invested at 10 percent would grow to $100 in two years (it would grow to $90.91 in one year and to $100 in the second year). Thus, $82.64 is the present value, at 10 percent, of a $100 cash flow two years hence. The present value of cash flows for other numbers of years in the future is found in a similar fashion. The formula is given by:

$$\text{Present Value} = \frac{\text{Future Value}}{(1+E)^j} \qquad (1)$$

where: E = the discount rate, expressed as a fraction (e.g., 0.10 corresponds to 10 percent).

j = the number of years in the future in which the cash flow occurs.

Future Value = the value of the cash flow in the future.

Applying this technique to all future pollution control cash flows converts each cash flow into its present value equivalent.[1] The sum of these individual values represents the equivalent cost, in terms of a single present value, of all future cash flows arising from the requirement to purchase and operate pollution control equipment.

[1]For a more thorough discussion of this concept see the capital budgeting chapters in the Weston and Brigham or Van Horne texts previously cited.

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THE VALUE OF DELAY

For each polluting facility there is a date by which compliance should have been achieved. Under Section 120 of the Act, as implemented, the period of covered noncompliance -- i.e., the period over which a noncompliance penalty must be assessed -- begins on the date on which a notice of noncompliance is received. Therefore, for purposes of calculating the penalty, it will be assumed that all capital expenditures should have been made by or on that date and that operating and maintenance expenditures should begin on that date.

The economic value of delay is assessed by comparing two sets of cash flows. The first consists of the flows that the firm would have experienced had it come into compliance on time. These include the flows attributable to the purchase and operation of the original equipment as well as those associated with any future replacement cycles. The second set of flows consists of those which the firm will experience when, following the delay, it actually does come into compliance. This second set of flows will have three properties:

- It will be similar to the first set in that it will have the same sequence of capital expenditures, depreciation tax savings, operating and maintenance flows, and so forth.
- It will begin at some time after the first day of noncompliance.
- The magnitude of each of its individual component flows will be greater than the corresponding flow in the first set to the extent that any given cost has inflated during the period of delay.

The present value of both sets of cash flows, as of the first day of noncompliance, can be calculated in the manner described above. The present value of the second set will be lower, reflecting the fact that delaying compliance yields a financial benefit to the firm. That benefit is equivalent to the economic savings from delay. Thus the economic value of delay is equal to the present value of the cash flows in the first set (on-time compliance) less the present value of those in the second set (delayed compliance). This calculated value of economic savings in turn becomes the basis on which the noncompliance penalty is derived.

THE EFFECT OF PRECOMPLIANCE EXPENDITURES

It is implicitly assumed in the above discussion that capital expenditures associated with delayed compliance were made in a single payment on the first day that the firm is projected to come into compliance and that no operating and maintenance expenditures were required prior to that time. The Act requires that the penalty take into account any expenditures on pollution control equipment made by the firm prior to the date the firm comes into compliance. The procedure used to account for these precompliance expenditures is begun by dividing the value of delay into its two components. The first component is the return earned on the capital costs of the pollution control equipment whose purchase has been delayed. The second component is the operating and maintenance costs avoided during the period of delay. An adjustment is made to each of these components of the penalty to account for the firm's precompliance expenditures.

To adjust the capital component, the capital component of each period's penalty is multiplied by a factor representing the proportion of the capital investment which is still to be made. The result is the adjusted capital component of the pen-

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alty. Thus the firm receives a credit (a reduction in the capital component of the penalty) in proportion to the amount of the capital investment in pollution control equipment already made.

The operating and maintenance component of the savings is adjusted to a value which is net of any actual operating and maintenance expenditures made during the period of noncompliance. The present value of the operating and maintenance expenditures made by the firm during the period of noncompliance, on an after-tax basis, are subtracted from the operating and maintenance component of the savings. The remainder is the adjusted operating and maintenance component of the penalty.

CONVERSION OF SAVINGS INTO THE NONCOMPLIANCE PENALTY

The Act specifies that the total penalty assessment is to be paid in a series of equal quarterly payments. EPA interprets this provision to mean equality in real or constant dollar terms. The quarterly payments, therefore, should increase at the projected rate of inflation. When deflated, such penalty payments will be equal in real terms (that is, in constant dollars).

Once the present value of the savings from delay has been calculated and adjustments have been made to account for precompliance expenditures, the magnitude of the required quarterly payments may be determined. Since the period of noncompliance has been estimated,[1] the next step is to create a series of quarterly payments during this period (with each payment increasing at the rate of inflation) and with the present value of all payments summing to the economic value of delay which was just calculated. A formula for making this conversion is described in Section V.

[1]Any error in its estimation can be corrected at the time of the post-compliance settlement.

POST-COMPLIANCE SETTLEMENT

The initial calculation of the noncompliance penalty is based on estimates; that is, an estimate of the costs of purchasing and operating the required pollution control equipment, an estimate of the schedule of precompliance capital and operating expenditures, and so forth. These estimates will have represented the best judgment of the firm's management or of independent consultants. The law, however, requires that a procedure be established whereby the penalty can be adjusted after compliance has been achieved to arrive at a final computation of the benefit of delayed compliance.

As described in the preceding discussion, the noncompliance penalty has two components, one related to capital costs and the other to operating and maintenance expense. The settlement process is similarly divided into capital and operating and maintenance components.

Once the capital equipment has been purchased and installed, the associated costs can be determined from the firm's accounting records. These, however, do not represent the costs which, had estimation been perfectly accurate, would have been used in the original penalty calculation. The cost used then was the estimated amount which would have been expended at the time the penalty was first assessed had the firm come into compliance on that date. The actual expenditure, coming at a later date, would reflect the impact of inflation. Therefore, for purposes of recomputing the penalty, the amount actually spent to comply must be deflated to remove the effect of inflation.

Similarly, the actual operating and maintenance costs cannot be determined until after the pollution control equipment has been in operation for some time. If a post-compliance settlement were to reflect the actual level of such costs most accurately, settlement could not take place for months or even years after compliance has been achieved. However, the Act requires settlement within six months of the date on which compliance is achieved. If at the time of post-compliance settlement it is apparent that the original estimate for operating and maintenance expense was inaccurate, an adjustment to the original savings calculation should be made by revising the operating and maintenance component.

The rate of return on equity capital and the rate of inflation are both estimated using historical averages. This is true of the shares of firm's capital structure represented by debt, preferred stock and common equity as well. More current information will become available during the period of noncompliance. Therefore, at the time of the post-compliance settlement, the historic averages will be updated using the current information available to provide more recent estimates of the rate of return on equity capital, rate of inflation, and the firm's capital structure.

These revised estimates -- capital costs, operating and maintenance costs, the rate of return on equity capital, the inflation rate, and the firm's capital structure -- and the actual schedule of precompliance expenditures are then substituted into the noncompliance penalty formula and a revised penalty series is calculated. The difference between the penalties actually paid and the revised amounts constitutes the basis for the post-compliance settlement. If the penalty has been overpaid, the excess will be refunded with interest. If it has been underpaid, the deficiency must be paid, also with interest. Under the Act, the rate of interest for underpayments and the rate of interest for overpayments will be set by the Secretary of the Treasury.

SECTION III

ASSUMPTIONS UNDERLYING THE PENALTY CALCULATION

The basic concept underlying calculation of the noncompliance penalty is that the economic savings resulting from delaying compliance with pollution control regulations should be removed. Implementing this concept requires several assumptions which were only implicit in the discussion in the previous section. These assumptions are explained in this section.

The calculation of the savings to a firm from delaying compliance is based on principles of financial and economic theory which are widely accepted or which have been selected as most appropriate for the purpose of calculating the penalty. The methodology itself is routinely used by firms making their own investment decisions. The assumptions involved are, for the most part, integral to the methodology itself. Similarly, the parameters and the data sources specified for such parameters are, with few exceptions, those which would commonly be employed by financial analysts.

1. The relative mix of debt, preferred stock and common equity allocated to pollution control equipment is the same as that found in the firm's capital structure as shown on its balance sheet.

On the balance sheet of any firm, total net assets, including net working capital, are exactly equal to total long-term financing. Any increase or decrease in net assets must be accompanied by a similar change in long-term financing. Under the allocation scheme assumed in the formulae, each asset is allocated a share of each source of long-term financing (long-term debt, preferred stock, and equity) proportionate to its share of the total net asset structure. Thus the sum of the shares of each source of long-term financing allocated to an asset will exactly equal the net book value of that asset. As the asset is depreciated, its share of each source of long-term financing declines but, other factors being equal, the mix of debt, preferred stock, and equity associated with that asset is unchanged.

Implicit in the assumed allocation system is the related assumption that the mix of total sources of financing is optimal and therefore constant over the life of any particular asset. The mix of financing employed by a firm may fluctuate on a year-to-year basis due to short-run discontinuities.[1] The mix may also be subject to longterm, secular changes due to gradual changes in the evaluation of management or financial markets as to what mix is optimal. During the intermediate period in which the useful lives

[1]Firms are often observed issuing new stock or selling bonds, but rarely do the two occur simultaneously. Thus, the capital structure of a firm may fluctuate from year to year. However, as discussed below, an accepted principle of financial theory is that each firm has an optimal financial structure which it aims to preserve over the long run. Obtaining long-term financing, such as a new debt or equity issue, is expensive and time-consuming and, therefore, firms tend to secure large amounts at one time. Thus, the firm's capital structure may fluctuate on a year-to-year basis, even though the long-term structure remains unchanged.

lives of most assets fall, however, the mix of debt, preferred stock, and equity is assumed to be constant and unaffected by the addition or subtraction of any particular asset for which financial support is required. Given this assumption, it follows that an appropriate basis for allocating financial sources to particular assets is the pro rata basis used here.

An alternative and less desirable approach would be to assume that the addition or subtraction of pollution control equipment from a firm's total net asset structure will lead to a long-term change in the firm's financial structure. Using this approach, it would be appropriate to assign to an asset a pattern of financing different from that of the firm as a whole. In theory, financing could be provided solely by debt or by equity. As is discussed below, however, there is no reason to believe the nature of the asset involved will have a unique effect requiring financing different from other assets.

At one extreme is the assumption that the entire cost of the equipment is financed by equity, typically the most expensive source.[1] This assumption is based on the argument that pollution control equipment is not a "normal" investment, that is, an investment which holds the promise of creating future returns. It is the expectation of future returns which enables the firm to borrow since its capacity to earn returns and hence honor fixed debt obligations is not diminished. An investment which does not increase productive capacity, it is argued, does not add to the firm's ability to carry debt and would therefore be funded entirely from equity. This would tend to increase the cost of the pollution control investment and hence increase the penalty for delaying that investment.

[1]See, for example, Pogue, Gerald A., Estimation of the Cost of Capital for Major United States Industries with Application to Pollution Control Investments, Environmental Protection Agency, EPA-230/3-76-001, November 1975. p. 5-16.

This argument incorrectly assumes that non-productive pollution control equipment will generate no return to the firm. While such equipment does not generate a direct return, some of the cost will be passed through to the customers of the firm and will result in indirect revenue effects. Assuming (as the penalty provision seeks to ensure) that pollution control requirements are applied equally throughout the economy, there is no reason to believe that pollution control costs will not be eventually recovered through the increased price of the firm's products. Thus, the addition of pollution control assets need not in the long run alter a firm's debt-coverage capability.

At the other extreme is the assumption that the firm will finance the investment in pollution control equipment entirely with debt. The argument advanced for making this assumption is that a firm may issue new debt, often in the form of pollution control bonds or some other low-cost instrument, in order to raise the funds needed to purchase the pollution control equipment since debt is generally the least expensive form of financing. However, the fact that pollution control equipment may be financed with cheaper debt does not mean that the installation of such equipment will alter the perceived optimal capital structure of the firm. While pollution control equipment may create an increase in debt in the short run (because new debt can be acquired on favorable terms), the imbalance will eventually be rectified by increases in equity and/or reductions in other long-term debt. This is because the maximum amount a firm will be able to borrow depends on management's and lenders' perceptions of risk -- that is, the underlying ability of the firm to support a certain proportion of debt. The addition of pollution control equipment should not change this perception of risk, other factors being equal. Thus, a temporary increase in debt would be eventually adjusted to the perceived optimal level.

The assumption of a constant financial structure over the life of an asset is therefore reasonable. Given this assumption, it is appropriate to assign to any particular asset a mix of financing which is identical to the overall mix which supports the total asset base. Hence, the pro rata system utilized in the penalty formulation follows directly. This assumption also represents a middle ground between all-equity and all-debt financing with respect to the size of the resulting noncompliance penalty.

2. Cash flows are discounted using the equity method.

The rate used to discount future cash flows is the firm's return on equity. The equity discounting method is one of several approaches to evaluating capital investments which have been developed. The equity discounting method provides the advantage of explicitly recognizing the cash flows arising from debt and preferred stock financing by subtracting out all cash flows arising from debt or preferred stock financing. The remainder is discounted at the rate of return on equity.

This method of discounting explicitly recognizes the fact that debt is a fixed obligation. Regardless of the return earned on the project, the bondholders will receive the agreed upon interest and principal payments.[1] If a project earns more than the firm's required return, the bondholders will be given no share of the excess return. If a project earns less than the firm's required return, the bondholders' return is not reduced. The equity discounting method acknowledges these financial arrangements by explicitly accounting for interest and principal payments and then discounting the residual by the cost of equity.

[1] The only exception occurs if the firm declares bankruptcy and there are insufficient funds to repay the bondholders in full.

The equity discounting method also holds constant the capital structure of the firm by recognizing that if a project earns less than the firm's required return, the shortfall must be funded using additional equity capital. Since the shortfall will reduce the retained earnings of the firm (an equity account), the firm must compensate for this reduction by eventually raising additional equity capital in order to deep a constant capital structure. If this shortfall were funded with both debt and equity, the portion of debt in the capital structure would rise. This implies that projects which result in inadequate returns would increase the debt capacity of the firm. Although, as discussed above, long-term debt capacity may not be lowered due to the undertaking of the pollution control investment, it is unlikely to increase as a result of this investment.

An alternative to the equity discounting method is the weighted average cost of capital method. This is the method often illustrated in introductory textbooks in corporate finance.[1] The method works by discounting incremental operating cash flows. That is, it computes cash flows resulting from investment in pollution control equipment without considering how the investment is financed. This rate is developed by computing a weighted average cost of capital with the weightings based on the overall capital structure of the firm.

While the weighted average cost of capital is the commonly accepted method for ranking investment alternatives, it is not the appropriate method to use in the special case of a required investment which yields no direct return to the firm. It ignores the fact that debt is a fixed obligation and that the agreed upon interest and principal must be paid, regardless of the inadequate earnings on the project.

[1]See Weston and Brigham, op. cit.

3. The noncompliance penalty is computed as a non-tax-deductible expense to the firm.

In calculating the costs on which the penalty is based, the normal tax consequences of interest, depreciation, and operating and maintenance expenditures are taken into account. If the penalty were to be allowed as an expense for tax purposes, it would need to be adjusted upward such that its after-tax cost to the firm would be the amount calculated herein.

4. Cash flows take place at the end of each month.

While expenditures such as those for operating and maintaining equipment obviously are incurred throughout the course of the month, this assumption greatly simplifies the computation. Its effect is to lower the penalty slightly from the level it would have if these expenditures were assumed to be made on a continuous basis throughout the month.

Similarly, the cash flows arising from depreciation and those associated with long-term financing, both principal repayment and interest or dividend payments, are assumed to take place at the end of each month.

5. The rate of inflation of pollution control operating and maintenance expenditures is the same as that for pollution control capital costs.

The assumptions of the model regarding inflation of pollution control capital costs are described in Section IV in the discussion of the sources of data. Just as there is no index of pollution control capital costs, currently there is no identifiable index of pollution control operating and maintenance expense. The development of an index reflecting past increases in operating and maintenance expense would require substantial resources and would probably not result in a significant increase in the accuracy of the penalty. The inflation in operating and maintenance

expenses will depend primarily on the inflation in labor and materials cost. As described in Section IV, the index of inflation for pollution control capital costs includes both of these elements.

6. The noncompliance penalty is calculated using a thirty-year time horizon.

Firms benefit from delay both by having funds for other investments during the period of noncompliance and by displacing into the future the need to replace the pollution control equipment. In order to assess the benefit from a delay in compliance appropriately, all the cash flows incurred over a specified time period must be considered. The time periods used for both the on-time compliance and the delay case must end simultaneously so that the present values of the costs calculated in each case are directly comparable.

A time horizon equal to thirty years beginning at the time the notice of noncompliance is received was chosen as the time horizon for both the on-time compliance and the delay case. There exists no standard long-range planning horizon throughout all industries. However, thirty years is a common estimate and it is a reasonable assumption for most industries. Many firms evaluate long-term, large scale investment such as pollution control equipment over a long-term planning horizon. Since the use of a thirty year planning horizon to calculate penalty amounts is consistent with the planning procedure of many firms, the use of a thirty year horizon will make the firm indifferent to the alternatives of on-time compliance or delayed compliance plus a penalty.

One alternative to the thirty year time horizon considered was the use of a specified number of replacement cycles.

However, the use of a fixed number of replacement cycles has the disadvantage that it requires the comparison of two investments of unequal duration. For example, if a firm were to delay compliance by one year and the equipment had a useful life of ten years and the penalty was evaluated over a single replacement cycle, the on-time alternative would end in year ten while the delay alternative would end in year eleven. Thus, the penalty calculation would require the comparison of a ten year series of cash flows with an eleven year series of cash flows.

The use of an infinite number of replacement cycles, as originally proposed, avoids the need to compare two cash flow streams of unequal duration. The use of an infinite number of replacement cycles assumes an endless chain of similar pollution control devices will be installed on the underlying source of pollution. It can be argued that this is not the case since clean air regulations will change over time, technological advances in pollution control equipment will occur, and the underlying source of pollution will be retired, altered or otherwise modified. Thus firms are unlikely to consider costs incurred more than thirty years in the future in their decision to delay an investment in pollution control equipment.

The use of a single replacement cycle was also considered. However, it is clear that a delay in the installation of pollution control equipment confers an advantage to the firm beyond the first cycle of equipment. Even though future requirements for pollution control are uncertain, it is likely that there will be requirements for pollution control beyond the first cycle of equipment. The use of a single replacement cycle would therefore ignore the benefits which accrue to the firm from the delay of the purchase of future replacement equipment of whatever type. The use of a single replacement cycle would understate the penalty

and thus fail to capture the economic benefits enjoyed by the firm.

7. The salvage value of any equipment with useful life remaining at the end of the thirty year time horizon is zero.

The choice of a thirty-year time horizon requires the selection of a method to determine the salvage value for the pollution control equipment. If, for example, the useful life of the pollution control equipment is ten years, on-time compliance would involve installation of the equipment at the beginning of years one, eleven and twenty-one. At the end of year thirty, the equipment installed in year twenty-one will have no remaining useful life. If compliance is delayed for one year, the third cycle will be initiated in year twenty-two and at the end of year thirty the firm would have pollution control equipment with a remaining useful life of one year. A salvage value must be estimated for the value to the firm of having pollution control equipment with some remaining useful life at the time horizon.

The economic value of any remaining useful life in pollution control equipment at the time horizon can be set based on several assumptions. Some possible alternatives for this value are zero, the book value of the equipment at the planning horizon, or the replacement value of the equipment at the horizon. The salvage value assumption chosen is that the pollution control equipment has zero economic value at the end of the time horizon. The reasoning behind this assumption is that the thirty-year time horizon represents, among other things, the time period over which EPA can reasonably expect firms to plan to meet the agency's clean air regulations by installing existing controls or controls similar to those currently existing. This implies that the equipment will be rendered obsolete at the end of the horizon due to changing conditions. Consistent with this reasoning is the assumption that the

equipment will have no value in any other application, nor will it be required in its current application beyond the time horizon. In this case, then, the salvage value of the equipment would be zero and the only cash flow that would result at the end of the planning horizon would be a tax benefit arising from writing off the remaining undepreciated portion of the equipment[1] and the repayment of outstanding debt and preferred stock.

8. The discount rate is not less than the inflation rate.

If a firm has a choice between making an investment which yields a direct positive return and an investment which yields no direct returns, it would choose to make the former. The firm required to invest in pollution control equipment might seek to delay such an investment since the longer it delays, the longer it can keep its funds invested in projects producing positive returns.

However, when the inflation rate is greater than the discount rate, this benefit from delay may no longer exist. For example, assume that the firm could invest $1000 in projects returning seven percent but that the pollution control equipment cost were increasing each year at an eight percent rate. If the firm delayed compliance one year it would have earned $70 on its investment but the pollution control equipment would cost $80 more. Under such circumstances, in terms of capital cost, the firm would

[1] If any portion of the equipment is not depreciated at the end of the time horizon, it is assumed that the undepreciated portion can be written off as a loss for tax purposes at the end of the planning horizon.

be better off complying immediately if it planned to comply at some time.[1] A firm which nonetheless delays is most likely doing so because its own estimate of the returns available to it on alternative investments is higher than the discount rate used in computing the penalty or because the value of the operation and maintenance expenditures avoided during the period of delay exceeds the increase in the present value of the capital costs.

It is possible that the discount rate might be less than the inflation rate for some historical period in the data sources to be used for calculating noncompliance penalties. EPA considers such data an inappropriate basis for future expectations. Therefore, in the unlikely event that computations using the historical data yield a discount rate less than the inflation rate, the discount rate will be set equal to the inflation rate. A similar adjustment will be made, if necessary in the post-compliance settlement.

[1] In some circumstances, there may still be a benefit to delay even if the inflation rate exceeds the discount rate. If the firm delays a sufficiently long period, the firm may avoid an entire replacement cycle.

SECTION IV

DEFINITIONS OF PARAMETERS AND SOURCES OF DATA

Calculation of the penalty requires estimates of a large number of financial parameters, many of which are specific to the noncomplying firm. This section contains definitions of these parameters and sources from which their numerical values are to be drawn.

1. Capital Investment Schedule

This schedule is an estimate of monthly expenditures to be made for purchase and installation of the required pollution control equipment. It includes not only direct purchase costs, including sales taxes, but also such expenditures as site preparation, engineering design, shipping costs, and installation expenses.

In the event that contracts have been signed for construction or purchase of the required equipment, they should be used as the basis for such costs. Other possible bases include engineering estimates, quotations from equipment manufacturers and, where no other data are available, reasonable estimates by the owner of the facility.

2. Operating and Maintenance Expense

This parameter is an estimate of the monthly cost of operating and maintaining the required pollution control equipment. That is, this amount should represent the average monthly operating and maintenance expense the firm would have incurred in the initial year of compliance. There is a provision in the formula-

tion which automatically adjusts future months' operating and maintenance expense for anticipated inflation.

Losses in production capacity and incremental energy costs which will be incurred as a direct result of operating the pollution control equipment should be counted as an expense in this category. On the other hand, the value of any byproduct recovery resulting from such operating should be deducted. To the extent that these or other factors will result in the real cost of operating and maintenance varying over time, an estimated schedule of payments must be provided.

Sources of estimates for operating and maintenance expense include equipment manufacturers, engineering consultants and the owner of the facility. These estimates should include all recommended operating and maintenance procedures, training and planning costs, cost of warranties, recordkeeping and costs of monitors.

3. Investment Tax Credit

This credit is a reduction in federal or state income taxes payable as a result of making qualified capital investments. It is equal to a specified percentage of the portion of the initial capital costs which qualify under U.S. Internal Revenue Service (IRS) regulations. The investment tax credit is included in the formulation because it has the effect of reducing the cash outflow required to purchase the pollution control equipment.

The applicable percentage is given in the Internal Revenue Code as are the criteria for qualifying investments. Further details are provided in Attachment B.

4. Marginal Income Tax Rate

This rate is the fraction of the last dollar of taxable income which must be paid by the firm to federal, state and local governments. It is the amount by which taxes would increase if taxable income were to increase. It is different than the average income tax rate -- total income tax divided by taxable income.

The tax rates of the various levels of government are specified by statute and depend on the level of taxable income reported by the owner of the polluting facility. A formula for computing the marginal income tax rate for a firm subject to income taxation by more than one level of government is given in Attachment D.

The noncompliance penalty is based on the incremental savings from delaying investment in pollution control equipment. The tax effects will depend on the rate applied to the incremental cash flows -- the firm's marginal income tax rate.

An alternative to using the marginal income tax rate would be to use the average rate. The advantage of using such a rate is that it can be calculated directly from data contained in the firm's financial statements. However, the use of an average rate would not result in a correct computation of the tax consequences of an incremental investment. It was therefore rejected as the appropriate tax rate.

5. Inflation Rate

This is the annual rate at which both capital and operating and maintenance costs are expected to grow. These cost increases are the result of inflation in various factors such as labor, capital goods and energy.

For purposes of computing the noncompliance penalty, the annual compounded change in the Chemical Engineering Plant Cost Inflation Index for the most recent 60 months of data is to be used as an estimate of the future rate of increase in pollution control expenditures.[1] The Chemical Engineering Plant Cost Index is based on a weighted average of four cost components: (a) fabrication and equipment, (b) engineering and supervision, (c) construction labor, and (d) building costs. The weights are determined by a survey of the chemical industry made by Chemical Engineering magazine. The cost components are derived from the producer price indices compiled by the Bureau of Labor Statistics.

There is no widely available index of pollution control equipment costs as such. The Chemical Engineering index is based on factors which are clearly important components of such costs. The principle alternative considered was to use some broader and more universally recognized index, such as the GNP implicit price deflator. This was considered to be an inferior choice since it is based on a broad range of factors (food, housing, medical costs, and so forth) only loosely related to the cost of pollution control equipment.

[1] Chemical Engineering, McGraw-Hill, Inc., April 28, 1975 and subsequent issues. For the years 1972-1977 this rate was 8.3 percent.

A problem with using any historical index to project the future is that changing conditions may make the estimates inaccurate. Using an inflation rate over the past several years as an estimate of the future rate may appear to be an example of such a problem. Offsetting this problem to a great extent is the fact that a similar approach is being used for the discount rate. Since the inflation and discount rates act in opposite directions with respect to pollution control cash flows (that is, the inflation rate is used to increase future values while the discount rate is used to reduce them), any error introduced by using an historic inflation rate is counteracted by using an historic return on equity as the discount rate. Furthermore, both the discount rate and the inflation rate will be updated using more current information at the time of post-compliance settlement.

6. Discount Rate

This is the percentage rate to be used as the basis for discounting cash flows in future years. Such discounting is necessary to convert cash flows occurring in different years into present values. The source of the discount rate is the industry average return or the all-manufacturing average return on the net book value of common stockholders equity, whichever is higher. These rates are reported by the Federal Trade Commission in its Quarterly Financial Report for Manufacturing, Mining and Trade Corporations.[1] They are based on an exhaustive sample of the firms in each industry and, subject to the limitations found in

[1] For public utilities, the return on equity data is found in the April issues of Citibank's Monthly Economic Letter. The utility return on net worth is to be used as the discount rate for utilities.

all accounting data, represent an accurate estimate of the past performance of U.S. industries. To smooth out year-to-year fluctuations, the discount rate used in computing the noncompliance penalty is the average of the most recent twenty quarters. However, as was discussed in Section III, a discount rate cannot be used that is lower than the inflation rate.

In theory, the appropriate rate to include in the formulae is the marginal rate of return on equity; that is, the rate which investors would require in order to commit additional common equity funding to the firm. The estimation of such a rate is difficult. One possible estimate of this rate is the internal "hurdle rate" which firms use to evaluate capital investments. This rate would automatically provide an insight into the firm's own estimate of the opportunity cost of additional equity capital. However, because a hurdle rate is not used internally by all firms, because it is often very subjectively determined, and because it would be administratively difficult to obtain, it was rejected as an estimate of the discount rate.

Another alternative means of estimating the discount rate is the expected future return on a share of the firm's common stock. Unfortunately, only the stocks of a small percentage of firms are publicly held and frequently traded and hence, have realistic share prices. Moreover, even if such prices exist, the expected return would have to be estimated. It is doubtful whether a satisfactory means could be found for providing these estimates.

Other estimates of the opportunity cost of equity funds based on economic and finance theory are available in the literature.[1] However, there currently exists no commonly accepted methodology for making such estimates and the cost of updating these estimates is prohibitive. Hence, these estimates were also rejected as a source of the discount rate. The use of either these theoretical estimates or the hurdle rate estimates would have resulted in higher penalties since these estimates tend to be higher than the average return on equity over the past five years.

The shortcomings of the methods described above have led to the selection of a return on equity which is based on book values. However, since the appropriate discount rate should reflect the expected earnings on the firm's current investment opportunities rather than its past investments, the higher of the industry average rate or the all-manufacturing average rate of return is used rather than a firm-specific rate. It is assumed that firms in industries which historically have earned more than the all manufacturing rate of return will continue to have investment opportunities available to them which will yield a higher than average rate of return. For firms in industries which have historically earned less than the all manufacturing rate of return, the all manufacturing rate of return is more indicative of the return on the future investment opportunities available to the firm.[2]

Certain consequences result from the use of industry average data rather than firm-specific data. If firm-specific data were employed, those firms with high historical returns

[1] See, for example, Gerald A. Pogue, Estimation of the Cost of Capital for Major United States Industries with Application to Pollution Control Investments, Environmental Protection Agency, EPA-230/3-76-001, November 1975.

[2] The industry average rate of return is employed as the discount rate for utilities, even if the all manufacturing rate is higher, since the investment opportunities available to utilities may be limited by federal or state law or public utility commission practice.

would, all else being equal, pay higher penalties. Similarly, firms whose returns have been below industry average would pay lower penalties. Since the savings to a firm from delaying compliance is related to future returns on equity, the question becomes whether the future returns of a specific firm will best be estimated by its own past performance. The fact that individual firm performance is influenced by a variety of factors, often peculiar to the firm and not likely to be repeated, and that future returns are more closely related to the investment opportunities available to industry argues for the use of industry average data.

The use of an industry average rate or the all-manufacturing rate also eliminates the need to verify firm-specific rate of return calculations. Particularly in the case of small firms, the amount and timing of reported earnings could be significantly altered such that a rate of return computed on their book value would be meaningless. In the case of partnerships or sole proprietorships, it would be difficult to disentangle personal finances from company finances. The lack of sufficient resources to verify these data argue strongly for the use of an average rate.

7. Interest Rate

This is the current rate of interest which would be paid by the firm if additional debt were to be acquired. The interest rate is found by taking the average yield as published in Moody's Bond Record on corporate bonds of a grade equal to that on the firm's bonds having the highest rating.

If a firm's debt is not rated, the interest rate is found by using the current rate of interest on grade "A" corporate industrial bonds, published in the Bond Record. The current interest rate on grade "A" corporate bonds was chosen because it is a widely available figure which estimates the rates appropriate to a large percentage of firms. Since Moody's Bond Record does not provide average yields for bonds rated lower than "Baa", firms with

debt rated "Baa" or lower will use the "Baa" rate of interest.

If the firm expects to use industrial development bonds (IDB's) to finance all or a portion of its investment in pollution control equipment, a weighted average of the corporate bond rate and the IDB rate[1] will be used as the interest rate in the model. The calculation of this weighted average is explained in the Attachment E.

8. Preferred Stock Dividend Rate

This is the rate which would be paid by the firm to its preferred stockholders on new issues of preferred stock. Like return on equity and the interest rate, the dividend rate on preferred stock represents the marginal cost of this component of long-term financing.

If a firm has preferred stock outstanding which has a rating, the preferred stock dividend rate is given by taking the average yield on public utility preferred stock[2] of that rating as reported in Moody's Bond Record. If the stock is not publicly traded or has no rating, the rate is found by using the current preferred stock yield on grade "a" issues. Since Moody's Bond Record does not provide average yields for preferred stock rated lower than "baa" or higher than "aa", firms with stock rated "baa" or lower should use the "baa" rate and firms with stocks rated "aa" or higher should use the "aa" rate.

[1]The interest rate on IDB's is published by Smith, Barney, Harris Upham & Company in the Bond Market Review. This review is published weekly and the current yield on pollution control bonds is printed on the last page.

[2]Average yields are published only for public utility preferred stocks. Non-utility corporations, as well as utilities, should use these average yields if preferred stock is a part of their capital structure.

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9. Debt Share

This share is the proportion of long-term financing provided by long-term loans, bonds and other long-term interest-bearing instruments. It is a fraction, the numerator of which is the sum of all long-term debt accounts on the firm's balance sheet. The denominator of the fraction is the sum of these debt accounts plus preferred stock plus common equity investment.

The source of the fraction of debt is the share of debt in the firm's capital structure averaged over the five most recent years. The five year average is used to smooth out year-to-year fluctuations.[1]

10. Equity Share

This share is the proportion of the firm's long-term financing which is provided by common shareholders. It is a fraction, the numerator of which is the sum of all common equity accounts on the firm's balance sheet including common stock, retained earnings, capital surplus and any other accounts representing common equity investments.[2] The denominator of the fraction is given by adding to the numerator the sum of the preferred stock account plus all long-term debt issued by the owner (excluding portions of such debt in the current account).

[1]If financial statements are unavailable, which may be the case for some privately-held firms, the fraction of debt and equity used in the penalty calculation will be the five year average debt and equity share for the firm's industry. This can be calculated from the financial statement provided for the industry by the Federal Trade Commission in its Quarterly Financial Report for Manufacturing, Mining and Trade Corporations.

[2]Some firms carry Treasury stock as an asset on their balance sheet. Such stock should properly be shown as a contra-account to common stock. In cases where it is shown as an asset, it should be used to reduce the common equity accounts for purposes of this calculation.

The source of the fraction of equity in the investment is the average fraction of equity in the capital structure as given in the firm's five most recent annual financial statements.

11. Preferred Share

This share is the fraction of long-term financing provided by preferred stock. The numerator is given by the preferred stock accounts in the firm's balance sheet and the denominator by the quantity: long-term debt plus preferred stock plus common equity interest.

The source of the fraction of preferred stock in the investment is the average fraction of preferred stock in the capital structure as given in the firm's five most recent annual financial statements.

12. Depreciation

Computation of the noncompliance penalty involves consideration of the depreciation-related tax benefits of an investment in pollution control equipment. The firm may choose the method of depreciation to be used, subject to conformity with Internal Revenue Service guidelines. EPA's computer program to calculate the penalty automatically selects the depreciation method which results in the minimum penalty. This is done under the assumption that the firm would use the depreciation method which resulted in the lowest possible cost of compliance, and hence, the lowest penalty.

The depreciation life is the minimum number of years over which a particular investment in pollution control equipment may be depreciated. The source of this figure is the lower limit on the asset depreciation range for the appropriate class of as-

sets as given in the Internal Revenue Service publication Revenue Procedure 77-10. If the lower limit is greater than ten years, a ten year limit is used, consistent with the requirements of the Act.

13. Useful Life

The useful life of the pollution control equipment is the number of years it can be expected to operate before replacement.

The source of the useful life of the pollution control equipment is the asset guideline period for the appropriate class. These are provided by the Internal Revenue Service in Revenue Procedure 77-10. They represent IRS estimates of the average lives of assets within a particular industry. They were established after an exhaustive study of actual asset lives and will be updated as appropriate.

SECTION V

DERIVATION OF FORMULAE

Section II described the procedure used to determine the noncompliance penalty. This section follows the same general outline in deriving the formulae used to make the calculations. All symbols used in this section are defined in Attachment A. A complete description of the parameters used and their sources was given in Section IV.

POLLUTION CONTROL CASH FLOWS

To compute the savings from delaying pollution control investment requires that the cash flows be estimated over a thirty year fixed time horizon. The simplest approach to calculating the present value of the cash flows over thirty years is to calculate the present value of cash flows in the initial cycle of N months[1] and use that value as a basis for all other replacement cycles. The derivation described below uses such an approach.

Initial Cycle of Equipment

The first category is the cash flow resulting from the initial investment of equity. It is given by:

$$EI = II * Q \quad (1)$$

where: II = the capital cost of the pollution control equipment.

Q = the fraction of the firm's capital structure made up of equity.

From this amount must be subtracted the effect of the investment tax credit whose cash flow is given by:

[1] N represents the useful life of the pollution control equipment in months.

$$ITC = II * t_{ITC} \quad (2)$$

where: t_{ITC} = the adjusted investment tax credit rate.

The investment tax credit rate must be adjusted if not all of the investment qualifies for the credit. This adjustment is explained in Attachment B. Further, if the investment is financed with industrial development bonds and rapid amortization is selected (see Attachment C), only one-half of the normal investment tax credit is allowed on that portion of the investment so financed.

The initial cash flow at the beginning of the cycle is found by subtracting equation (2) from equation (1):

$$\begin{aligned} INITIAL_0 &= EI - ITC \\ &= II * Q - II * t_{ITC} \\ &= II * (Q - t_{ITC}) \end{aligned} \quad (3)$$

This cash flow occurs at the beginning of the first cycle -- at the end of month 0. The initial cash flow in the remaining months of the first cycle is zero. ($INITIAL_m = 0$ for $m \neq 0$.)

The second category of cash flow is the capital-related flow which occurs over the depreciable life of the equipment. It is made up of depreciation and the flows associated with financing the equipment. The effect of depreciation is to reduce the firm's tax liability. The depreciation cash flow in month m is given by:

$$DEP_m = II * d_m * t_{TR} \quad (4)$$

where: d_m = the fraction of the original cost depreciated in month m (see Attachment C).

t_{TR} = the firm's marginal income tax rate (see Attachment D).

As the equipment is depreciated, the book value of the equipment declines. The book value of the equipment at the beginning of month m is given by:[1]

$$(BOOK\ VALUE)_m = II * \left(1 - \sum_{k=0}^{m-1} d_k\right) \quad (5)$$

where: d_0 = 0 by definition

The remainder of the annual capital-related cash flow consists of principal repayments and financing charges (i.e., interest and dividends) on the debt and preferred stock issued to finance the equipment purchase. The amount of the initial investment financed by debt is given by:

$$DEBT\ SHARE = II * B \quad (6)$$

where: B = the fraction of the firm's capital made up of debt.

Debt is repaid each month in proportion to the depreciation of the asset. That is, at the end of each month the same fraction of the principal is repaid as the original book value of the investment is depreciated.[2] Therefore, the repayment of principal in month m is given by:

$$PRIN_m = d_m * II * B \quad (7)$$

[1] The declining book value does not in itself represent a cash flow. This equation is includsd here to simplify the calculation of the remaining book value of the equipment at the end of the thirty year time horizon which occurs later in this chapter.

[2] A variety of assumptions could be made concerning the debt repayment schedule. The formulae assume that debt is repaid over the depreciation life of the equipment. This assumption is made in order to hold constant the capital structure of the firm over the time horizon.

Interest is paid at the end of each month on the principal outstanding at the beginning of month m.

$$(\text{INTEREST CHARGE})_m = R_{INT} * (\text{PRINCIPAL OUTSTANDING})_m \quad (8)$$

where: R_{INT} = the firm's monthly interest rate (expressed as a decimal fraction).[1] See Attachment E

Since interest is tax deductible, only the after-tax effects should be considered in calculating the cash flow. Therefore, the interest payment net cash flow in month m becomes:

$$INT_m = R_{INT} * (\text{PRINCIPAL OUTSTANDING})_m * (1-t_{TR}) \quad (9)$$

The principal outstanding is the original amount borrowed, II * B, less the amount which has been repaid prior to the beginning of the month. The amount repaid prior to the beginning of month m is:

$$(\text{AMOUNT REPAID})_m = \sum_{k=0}^{m-1} II * d_k * B \quad (10)$$

where: d_0 = 0 as before.

The principal outstanding at the beginning of month m is the amount initially borrowed less the amount repaid by the end of month m-1.

$$(\text{PRINCIPAL OUTSTANDING})_m = II * B - \sum_{k=0}^{m-1} II * d_k * B \quad (11)$$

[1]The monthly interest rate, R_{INT}, equals $(1+R)^{1/12} - 1$, where R is the annual interest rate paid by the firm on new issues of debt.

Combining equations (9) and (11) yields a formula for the interest-related cash flow in year month m:

$$INT_m = R_{INT} * II * B * (1-t_{TR}) * (1 - \sum_{k=0}^{m-1} d_k) \quad (12)$$

The portion of the investment financed by preferred stock is given by:

$$\text{PREFERRED SHARE} = II * F \quad (13)$$

where: F = the fraction of preferred in the firm's capital structure.[1]

Just as the additional debt is repaid, the preferred stock is redeemed as the asset is depreciated. At the end of each month, the same fraction of the preferred stock is redeemed as the original book value of the investment is depreciated. Redemption in month m is given by:

$$PREF_m = d_m * II * F \quad (14)$$

Dividends on preferred stock are paid at the end of each month on the amount of stock outstanding at the beginning of the month.

$$DIV_m = R_{DIV} * (\text{PREFERRED OUTSTANDING})_m \quad (15)$$

where: R_{DIV} = the monthly dividend rate on preferred stock (expressed as a decimal fraction).[2]

[1]Note that Q + B + F must be equal to 1.

[2]The monthly dividend rate, R_{DIV}, equals $(1+R)^{1/12} - 1$, where R is the annual dividend rate paid by the firm on new issues of preferred stock.

These dividends are not tax deductible. The preferred outstanding is the original amount issued, II * F, less the amount redeemed prior to the beginning of the month. The amount redeemed prior to month m is:

$$(\text{AMOUNT REDEEMED})_m = \sum_{k=0}^{m-1} II * d_k * F \qquad (16)$$

where: $d_o = 0$ as before.

The amount of preferred outstanding at the beginning of month m is equal to the amount originally issued less the amount redeemed.

$$(\text{PREFERRED OUTSTANDING})_m = II * F - \sum_{k=0}^{m-1} II * d_k * F \qquad (17)$$

The preferred dividend paid at the end of month m is found by combining equations (15) and (17).

$$DIV_m = R_{DIV} * II * F * (1 - \sum_{k=0}^{m-1} d_k) \qquad (18)$$

Therefore, the total monthly capital-related charges for each month m of the initial cycle are:

$$\text{MONTHLY CAPITAL RELATED}_m = -DEP_m + PRIN_m + INT_m + PREF_m + DIV_m \qquad (19)$$

The negative sign preceding the depreciation cash flow results from the fact that this component represents a reduction in cash outflow. These monthly capital-related cash flows will occur over the depreciable life of the equipment. After the equipment is fully depreciated, these cash flows will be zero until the next cycle of equipment is installed.

The final category of cash flow is that associated with monthly operating and maintenance expenditures. These expenses grow each month at the monthly inflation rate. Like interest and dividend payments, they are assumed to be paid at the end of the month. They are tax deductible so their associated cash flows must reflect the effect of income taxes. Let $O\&M_m$ be the cash flow resulting from operating and maintenance expense in month m. Define M_0 as the monthly operating and maintenance expense before tax stated in current dollars as of the beginning of the period of noncompliance. The first payment actually made will be this amount escalated by the monthly inflation rate. The resulting cash flow is given by:

$$O\&M_1 = M_0 * (1-t_{TR}) * (1+i)$$
$$O\&M_2 = O\&M_1 * (1+i) = M_0 * (1-t_{TR}) * (1+i)^2$$
$$O\&M_3 = O\&M_2 * (1+i) = M_0 * (1-t_{TR}) * (1+i)^3 \qquad (20)$$

where: i = the monthly inflation rate.[1]

In general, the monthly O&M expense in month m is:

$$O\&M_m = M_0 * (1-t_{TR}) * (1+i)^m \qquad (21)$$

Future Cycles of Equipment

It is now necessary to expand these calculations to include the value of any future replacement cycles which occur in the thirty-year time horizon. This can be accomplished by recognizing that the costs incurred in any given future cycle are identical to those incurred in the corresponding year of the original cycle except that the costs have increased by the inflation

[1] The inflation rate will normally be given in annual terms. If "A" is an annual rate, its monthly equivalent "a" is given by:

$$a = (1+A)^{1/12} - 1$$

rate.[1] For example, the replacement of equipment after N months, when the original equipment wears out, gives rise to an initial equity investment equal to:

$$INITIAL_N = INITIAL_O * (1+i)^N$$

In general, the initial equity investment at the end of month m will be equal to the investment made N months ago inflated at a monthly inflation rate, i. The initial capital expense at the end of month m is, therefore, equal to:

$$INITIAL_m = INITIAL_{m-N} * (1+i)^N$$

This can also be generalized as:

$$INITIAL_{(j-1)N} = INITIAL_O * (1+i)^{(j-1)N}$$

for the jth cycle.

In most months this value will be zero. Cash flows due to the initial investment at the beginning of a cycle will occur only in months 0, N, 2N, 3N and so forth until the end of the thirty year (360 month) time horizon. If a cycle should end precisely at the end of the thirty year time horizon, it is assumed that the firm will not invest in replacement equipment at the end of the horizon. Thus, $INITIAL_{360}$ will always be zero.

[1] This assumption does not necessarily assume that equipment in future cycles is identical to that of the initial cycle, but does assume that costs are identical (except for inflation).

Similarly, the monthly capital-related charges in month m will be:

$$\text{MONTHLY CAPITAL RELATED}_m = \text{MONTHLY CAPITAL RELATED}_{m-N} * (1+i)^N \quad (23)$$

The monthly capital-related charges will occur in the first n months of each replacement cycle, where n is the depreciation life of the equipment in months. In all other months, the value of these cash flows will be zero.

And, finally, the monthly O&M expense in month m will be:

$$O\&M_m = O\&M_{m-N} * (1+i)^N \quad (24)$$

The monthly cash flow for each month m is the sum of these three values.

$$MCF_m = INITIAL_m + \text{MONTHLY CAPITAL RELATED}_m + O\&M_m \quad (25)$$

These cash flows can be calculated for each of the 360 months in the planning horizon.

Salvage Value of Equipment at End of Time Horizon

At the end of the thirty year time horizon the cash flows cease. However, the firm realizes tax benefits from the deduction of any remaining depreciation and must repay all outstanding debt and preferred stock. The salvage value of the equipment will be zero because it is assumed that technological or regulatory change will render the equipment obsolete at the end of the time horizon.

The additional depreciation cash flow in the final month is the tax shield from a writeoff of the remaining book value of the equipment. The book value of the equipment at the beginning of each month m is:

$$\text{BOOK VALUE}_m = (\text{BOOK VALUE})_{m-N} * (1+i)^N \quad (26)$$

Therefore, the final tax writeoff in month 360 is:

$$\text{DEP}_{\text{FINAL}} = t_{TR} * \text{BOOK VALUE}_{360} - \text{DEP}_{360} \quad (27)$$

The depreciation write-off equals the tax shield on the book value of the equipment at the beginning of month 360 less the tax shield from depreciation claimed in the month 360.

Similarly, the debt principal outstanding at the end of month 360 will be repaid. To estimate the principal outstanding at the end of month 360, the principal outstanding at the beginning of month m is estimated first:

$$(\text{PRINCIPAL OUTSTANDING})_m = (\text{PRINCIPAL OUTSTANDING})_{m-N} * (1+i)^N \quad (28)$$

The final principal outstanding at the end of month 360 will be the principal outstanding at the beginning of month 360 less the principal repaid during month 360.

$$\text{PRIN}_{\text{FINAL}} = (\text{PRINCIPAL OUTSTANDING})_{360} - \text{PRIN}_{360} \quad (29)$$

Finally, the outstanding preferred stock will be repaid at the end of month 360. The preferred stock outstanding at the beginning of month m is:

$$(\text{PREFERRED OUTSTANDING})_m = (\text{PREFERRED OUTSTANDING})_{m-N} * (1+i)^N \quad (30)$$

The final preferred stock outstanding at the end of month 360 will be the preferred stock outstanding at the beginning of month 360 less the preferred stock repaid during month 360.

$$\text{PREF}_{\text{FINAL}} = (\text{PREFERRED OUTSTANDING})_{360} - \text{PREF}_{360} \quad (31)$$

The sum of these final cash flows which will occur at the end of the thirty year time horizon is:

$$\text{CF}_{\text{FINAL}} = -\text{DEP}_{\text{FINAL}} + \text{PRIN}_{\text{FINAL}} + \text{PREF}_{\text{FINAL}} \quad (32)$$

DISCOUNTING THE CASH FLOWS

The present value of the cash flows in each month will be:

$$\text{PV}_{\text{MCF}_m} = \frac{\text{MCF}_m}{(1+e)^m} \quad (33)$$

where: e = the monthly discount rate.[1]

The sum of the present value of the cash flows for each month plus the final cash flow incurred at the end of the time horizon represents the cost to the firm of on-time compliance.

$$\text{PV}_{\text{PCE}} = \sum_{m=0}^{360} \text{PV}_{\text{MCF}_m} + \frac{\text{CF}_{\text{FINAL}}}{(1+e)^{360}} = \sum_{m=0}^{360} \frac{\text{MCF}_m}{(1+e)^m} + \frac{\text{CF}_{\text{FINAL}}}{(1+e)^{360}} \quad (34)$$

[1] As stated in Chapter III, the discount rate cannot exceed the inflation rate. The monthly discount rate, e, is equal to $(1+E)^{1/12} - 1$, where E is the annual discount rate.

THE VALUE OF DELAY

The quantity just calculated is the present value, as of the day on which compliance should have been achieved, of pollution control cash flows which the firm would have experienced had it not delayed. If compliance is delayed, the cash flows each month will be delayed and inflation will increase the magnitude of these cash flows. The cash flows which will be incurred each month m over the thirty year horizon if the firm delays L months will be:

$$MCF'_m = MCF'_{m-L} * (1+i)^L \quad \text{for } m > L \qquad (35)$$

where: i = the monthly inflation rate.
L = the number of months of delay.

Note that MCF'_m will equal zero for m less than or equal to L since during the period of delay no cash flows are incurred. As in the on-time compliance cash flow calculation, it is assumed that the firm will not install new equipment in the final month of the planning horizon.[1]

Also as in the on-time compliance calculation, any remaining book value may be written off in the final month of the horizon. The outstanding debt and preferred stock must also be repaid. This final cash flow is:

$$CF'_{FINAL} = [-t_{TR} * (\text{BOOK VALUE})_{360-L} + DEP_{360-L} + (\text{PRINCIPAL OUTSTANDING})_{360-L} - PRIN_{360-L} + (\text{PREFERRED OUTSTANDING})_{360-L} - PREF_{360-L}] * (1+i)^L \qquad (36)$$

[1] Thus, if the cash flow in month 360-L in the on-time compliance calculation has a non-zero initial capital component, this total cash flow should be adjusted by subtracting the initial capital component.

$$MCF_{360-L} = \text{MONTHLY CAPITAL RELATED}_{360-L} + O\&M_{360-L}$$

The present value of delay alternative is the sum of each of the cash flows in equations (35) and (36) discounted by the rate of return on equity:

$$PV_{DELAY} = \sum_{m=0}^{360} \frac{MCF'_m}{(1+e)^m} + \frac{CF'_{FINAL}}{(1+e)^{360}}$$

$$= \sum_{m=0}^{360} \frac{MCF_{m-L}(1+i)^L}{(1+e)^m} + \frac{CF'_{FINAL}}{(1+e)^{360}} \qquad (37)$$

The savings from delay is thus given by the difference between the present values of on-time compliance and delayed compliance:

$$SAVINGS = PV_{PCE} - PV_{DELAY} \qquad (38)$$

The savings from delay has two components. The first is the value of forgone O&M expenditures. The O&M component of the savings is the present value of the forgone O&M expenditures during the period of delay.

$$SAVINGS_{O\&M} = \sum_{m=1}^{L} \frac{O\&M_m}{(1+e)^m} \qquad (39)$$

The second component is the value of delaying all capital-related cash flows. The capital component of the savings is the remainder of savings.

$$SAVINGS_{CAP} = SAVINGS - SAVINGS_{O\&M} \qquad (40)$$

CONVERSION OF SAVINGS INTO MONTHLY EQUIVALENTS

In order to convert the savings from noncompliance into a series of penalty payments, it is necessary to express savings as a series of equivalent monthly amounts.[1] This series, which will be referred to as the "savings equivalent," must have two attributes:

- It must have the same present value as the cash flows which would have resulted from investment in and operation of the required pollution control equipment. When these amounts are translated into a penalty, this requirement is intended to insure that a firm which continues to delay its pollution control expenditures will not benefit by doing so.
- The savings equivalents must escalate at the rate of inflation. If this requirement is not met, the early penalty payments overstate the savings to the firm while later payments understate it.

Let S_j be the savings equivalent at the beginning of month j.[2] The requirement that the series escalate with inflation implies that:

$$S_2 = S_1 * (1+i)$$

$$S_3 = S_2 * (1+i) = S_1 * (1+i)^2$$

$$S_j = S_{j-1} * (1+i) = S_1 * (1+i)^{j-1} \qquad (41)$$

where: i = the monthly inflation rate.

[1]The final penalty payment will be made on a quarterly basis. However, in order to increase the accuracy of the penalty calculation, all adjustments to the economic savings are made on a monthly basis.

[2]It is assumed that penalties are paid at the beginning of each period in contrast to the cash flows which are assumed to occur at the end of each period.

The present value of each of these terms is calculated by discounting:

$$PV_{S_j} = \frac{S_j}{(1+e)^{j-1}} \qquad (42)$$

Combining with equation (41) yields:

$$PV_{S_j} = \frac{S_1 * (1+i)^{j-1}}{(1+e)^{j-1}} \qquad (43)$$

The present value of these L monthly savings equivalents must be equal to the savings from delay. Thus:

$$\text{SAVINGS} = \sum_{j=1}^{L} PV_{S_j}$$

$$= \sum_{j=1}^{L} S_1 * \left(\frac{1+i}{1+e}\right)^{j-1}$$

or

$$S_1 = \frac{\text{SAVINGS}}{\sum_{j=1}^{L} \left(\frac{1+i}{1+e}\right)^{j-1}} \qquad (44)$$

This represents the first term in the series. All terms after the first month can be computed by multiplying S_1 by the quantity (1+i) raised to the appropriate power. For example, the savings equivalent at the beginning of the k^{th} month would be:

$$S_k = S_1 * (1+i)^{k-1} \qquad (45)$$

The present value of these monthly savings equivalents is equal to the present value of the costs avoided during the period of noncompliance.

THE EFFECT OF PRE-COMPLIANCE EXPENDITURES

The series of savings equivalents just developed is based on the assumption that firm installing pollution control equipment will pay for it when installation is completed and operation begins. In fact, substantial precompliance expenditures will often be required before final installation is completed. In calling for the imposition of a noncompliance penalty, Congress explicitly required that these precompliance expenditures be accounted for in the penalty calculation. The adjustments needed to incorporate the effect of precompliance expenditures are described below. The procedure is begun by dividing the savings equivalent into its capital and its operating and maintenance components. The adjustment of the capital component of the penalty is described, followed by a description of the procedure for adjusting the operations and maintenance component of the penalty.

Adjustment of Capital Components

The method used to account for precompliance capital expenditures is to adjust the capital component of a month's savings equivalent by multiplying it by a factor representing the proportion of the capital investment which is still to be made prior to

the beginning of that month.[1] For example, if one-third of the total investment will have been made prior to the fifth month, the adjusted capital component of the savings for the fifth month is equal to two-thirds (the fraction of the investment still to be made) of the savings equivalent.

The computational procedure starts by rewriting formula (44) using formulae (39) and (40). This gives:

$$S_1 = S_1^C + S_1^M \qquad (46)$$

where:

$$S_1^C = \frac{\text{SAVINGS}_{CAP}}{\text{SAVINGS}} * S_1$$

$$S_1^M = \frac{\text{SAVINGS}_{O\&M}}{\text{SAVINGS}} * S_1$$

[1] Note that the capital expenditure credit includes only those payments made prior to the beginning of the month. The capital expenditure credit does not include expenditures made in the current month since cash flows are assumed to occur at the end of the month. Therefore, the firm was able to earn a return during the month on the current month's capital expenditure which it would not have earned if compliance had not been delayed. Hence, the firm's savings from delay in the current month should include this return.

The superscript C refers to the capital component of the savings equivalent and M refers to operating and maintenance component. Equation (45) for the capital component can then be rewritten as:

$$S_k^C = S_1^C * (1+i)^{k-1} \quad (47)$$

Let A_k^C be the month k capital component adjusted for precompliance expenditures. That is, A_k^C is equal to S_k^C times a factor representing the fraction of the initial capital investment (II) which remains to be made. If X_k^C is the fraction of the initial investment which has been made prior to the beginning of month k,[1] then:

$$A_k^C = (1-X_k^C) * S_k^C \quad (48)$$

Adjustment of Operation and Maintenance Component

The operating and maintenance component of the savings must be adjusted to a value which is net of any actual O&M expenditures made during the period of noncompliance. The adjustment of the operating and maintenance component, A^M, is equal to the present value of the operating and maintenance component of the savings ($SAVINGS_{O\&M}$ as defined in equation (39)) less the present

[1] Note that X_k^C has a value between 0 and 1.

value of any precompliance O&M expenditures made during the period of noncompliance.[1] Thus:

$$A^M = SAVINGS_{O\&M} - \sum_{k=1}^{L} \frac{P_k^M}{(1+e)^k} \quad (49)$$

where: P_k^M = precompliance operating and maintenance expense incurred in month k of the noncompliance period.

CALCULATION OF QUARTERLY PENALTIES

The Act requires that the noncompliance penalty payments be made on a quarterly basis and that all payments be of equal value. The EPA interprets this requirement to mean equality in real rather than nominal terms. Consequently, the series of payments must increase with inflation. This can be done by converting the monthly values of the capital component of the savings computed above into their present value equivalent, adding the present value of the O&M component of the savings, and then converting that present value into a new series of escalating quarterly payments. Let L be the number of months which compliance is delayed. Then the present value is given by:

$$PV_{\substack{ADJUSTED \\ SERIES}} = A^M + \sum_{k=1}^{L} \frac{A_k^C}{(1+e)^{k-1}} \quad (50)$$

[1] If this calculation should result in an adjusted O&M penalty less than zero the present value of the adjusted O&M penalty, A^M, shall be set equal to zero. The firm will not be allowed to offset any portion of the capital component of its penalty with precompliance O&M expenses.

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The series of escalating payments must have this same present value.[1] Thus, if P_q is the payment to be made at the beginning of quarter q, the following equality must exist:

$$A^M + \sum_{k=1}^{L} \frac{A_k^C}{(1+e)^{k-1}} = P_1 + \frac{P_2}{(1+e')} + \ldots + \frac{P_T}{(1+e')^{T-1}} \qquad (51)$$

where: e' = the quarterly equivalent discount rate.[2]

T = the number of quarterly payments.

[1]The number of required quarterly payments is determined from the months out of compliance using the formula:

$$T = \text{Integer}\,[(L+2)/3]$$

where: Integer = the closest integer less than or equal to the number in the brackets.

L = number of months out of compliance.

[2]The quarterly equivalent discount and inflation rate is found by taking the monthly equivalent discount and inflation rate to the third power. Thus:

$$e' = (1+e)^3 - 1$$
$$i' = (1+i)^3 - 1$$

where: e = monthly equivalent discount rate.
i = monthly equivalent inflation rate.

However, since $P_q = P_{q-1} * (1+i)$

$$A^M + \sum_{k=1}^{L} \frac{A_k^C}{(1+e)^{k-1}} = P_1 * \sum_{q=1}^{T} \left(\frac{1+i'}{1+e'}\right)^{q-1}$$

where: i' = the quarterly equivalent inflation rate.[1]

$$\text{or} \qquad P_1 = \frac{A^M + \sum_{k=1}^{L} \frac{A_k^C}{(1+e)^{k-1}}}{\sum_{q=1}^{T} \left(\frac{1+i'}{1+e'}\right)^{q-1}} \qquad (52)$$

$$\text{and} \qquad P_q = P_{q-1} * (1+i')$$

$$= P_1 * (1+i')^{q-1} \qquad (53)$$

[1]The quarterly equivalent discount and inflation rate is found by taking the monthly equivalent discount and inflation rate to the third power. Thus:

$$e' = (1+e)^3 - 1$$
$$i' = (1+i)^3 - 1$$

where: e = monthly equivalent discount rate.
i = monthly equivalent inflation rate.

These payments have the following properties:

- They are equal in real terms.
- Their present value is equal to the present value of savings after adjustments for pre-compliance capital and operating and maintenance expenditures.
- If either the assumed schedule of expenditures for compliance, the amounts of those expenditures, or the compliance date are inaccurate, the payments must be revised. This is discussed below.

POST-COMPLIANCE SETTLEMENT

The original penalty computation is based on the costs which the firm would have experienced had compliance not been delayed. If compliance is delayed, inflation will result in the actual expenditures being somewhat larger. This inflation-induced variation is already accounted for in the formulation described above. However, simple estimation error may also contribute to the difference and it is this error that the post-compliance settlement is intended to remedy.

The method involves recomputing the penalty using revised estimates of capital costs and operating and maintenance costs, and revised estimates of the discount rate, the inflation rate and the capital structure of the firm. These revised estimates are then used in conjunction with the actual schedule of precompliance expenditures to recalculate the penalty payments. The settlement is based on the difference between these payments and those actually paid.

The settlement amount is the cumulative overpayment or underpayment at the end of the noncompliance period plus interest on each month's outstanding balance (the cumulative overpayment or underpayment at the end of each month). The formula for computing the settlement payment is as follows: Let Δ_k be the difference between the penalty that was paid in month k and the amount which should have been paid in that month. Let s_k be the cumulative overpayment or underpayment at the end of month k, including interest. Then:

$$s_1 = \Delta_1 * r$$

and

$$s_2 = (\Delta_2 + s_1) * r$$

In general,

$$s_k = (\Delta_k + s_{k-1}) * r \qquad (54)$$

where:

s_k = the cumulative overpayment or underpayment at the end of month k, including interest.

Δ_k = the difference between the penalty amount paid in month k and the penalty amount which is computed using the revised estimates.

r = the monthly equivalent rate of interest determined by the Secretary of the Treasury.[1]

[1]The Secretary of the Treasury will designate an annual rate of interest for overpayments and an annual rate of interest for underpayments. For underpayments, the Secretary of the Treasury has determined that the rate of interest will equal the discount rate. Therefore, for each month with a positive outstanding balance indicating a cumulative overpayment ($\Delta_k + s_{k-1}$ greater than zero), r will equal the monthly equivalent of the interest rate for overpayments. For each month with a negative outstanding balance indicating a cumulative underpayment ($\Delta_k + s_{k-1}$ less than zero), r will equal the monthly equivalent of the discount rate as revised in the post-compliance settlement.

The total post-compliance settlement as of the date of compliance is given by:

$$\$ = \$_L \quad (55)$$

where: $\$$ = the total post-compliance settlement as of the date of compliance.

L = the total number of months of noncompliance.

$\$_L$ = the cumulative overpayment or underpayment at the end of the noncompliance period, including interest.

The total post-compliance settlement as of the day of compliance is then adjusted to reflect delay in the actual settlement payment. The final settlement amount is:

$$Z = \$ * (1+r)^D \quad (56)$$

where: Z = the actual settlement to be paid (or refunded) on the day of the settlement.

$\$$ = the total post-compliance settlement as of the date of compliance.

r = the monthly equivalent rate of interest specified by the Secretary of the Treasury.[1]

D = the number of months between the date of compliance and the actual settlement.

[1] The interest rate, r, will be the monthly equivalent of the interest rate for overpayments if $\$$ is greater than zero. If $\$$ is less than zero, r will equal the monthly equivalent of the discount rate as revised in the post-compliance settlement.

DELAYED PENALTY PAYMENTS

In general, any time a penalty payment (P) is delayed by k months, the actual payment should be equal to:

$$P * (1+e)^k$$

For example, if the first penalty payment is not paid until six months after the notice of noncompliance has been received, the first and second quarterly payments will be delayed for six and three months, respectively. If this occurs, the penalty payment after an initial six-month delay is equal to:

$$P_1 * (1+e)^6 + P_2 * (1+e)^3 + P_3$$

ATTACHMENT A

DEFINITION OF SYMBOLS

Note: All variables denoted with an asterisk (*) are expressed as decimal fractions in the formulae in Section V.. In the Instruction Manual the user is instructed to enter some of these variables as percentages; that is, 10 percent as opposed to 0.10. The computer model then converts these percentages to decimal fractions for use in the model.

A_k^C = the monthly equivalent of the capital component of savings adjusted for precompliance expenditures.

A^M = the O&M component of savings adjusted for pre-compliance expenditures.

B = the fraction of debt in the owner's capital structure (book value).*

b = the fraction of the investment financed by industrial development bonds and depreciated using rapid amortization.*

CF_{FINAL} = cash flow at end of thirty year time horizon if compliance is not delayed.

CF'_{FINAL} = Cash flow at end of thirty year time horizon if compliance is delayed.

D = the number of months between the date of compliance and the payment of the post-compliance settlement.

DEP_m = the net after-tax cash flow in month m resulting from depreciation of the initial investment.

DEP_{FINAL} = Tax shield from writeoff of remaining book value of the equipment at the end of the thirty year time horizon.

d_m = the fraction of original asset value depreciated in month m.*

D_j = the fraction of original asset value depreciated in year j.*

Δ_k = the difference between the penalty paid in month k and the amount computed using revised figures for capital and O&M costs.

DIV_m = the dividend payment in month m on the preferred stock used to finance the initial investment.

E = the discount rate.*

e = the monthly equivalent of the discount E.*

e' = the quarterly equivalent of the discount rate E.*

EI = the amount of cash provided by equity investors to finance the initial investment.

f = the fraction of the initial investment which is amortized on a straight line basis over five years.*

F = the fraction of preferred stock (at book value) in the owner's capital structure.*

G = the depreciation life of the pollution control equipment in years.

I = the annual rate of inflation for pollution control expenditures.*

i = the monthly equivalent of the annual inflation rate I.*

i' = the quarterly equivalent of the annual inflation rate I.*

IBD = the dollar value of industrial development bonds issued to finance the pollution control equipment.

INITIAL = initial equity investment at the beginning of a replacement cycle.

INT_m = the interest payment cash flow (after the effect of taxes) in month m on the debt used to finance the initial investment.

II_{qual} = amount of initial capital investment which qualifies for the investment tax credit.

II = the initial investment in pollution control equipment; the amount which will be capitalized on the books of the firm and amortized over the life of the equipment.

ITC = the dollar amount of the investment tax credit.

j,k,m = indices, usually indicating the year or month in which a cash flow occurs.

K = the number of owners of the firm.

L = the number of months the firm is expected to be out of compliance.

M_O = monthly operating and maintenance expense in current dollars as of the beginning of the period of noncompliance.

MCF_m = cash flow in month m if compliance is not delayed.

MCF'_m = cash flow in month m if compliance is delayed.

$MONTHLY\ CAPITAL\ RELATED_m$ = capital-related cash flows in month m.

N = the useful life of the pollution control equipment in months.

$'n$ = the depreciation life of the pollution control in months.

$O\&M_m$ = the net operating and maintenance cash flow in month m.

P_q = the penalty payment to be made at the beginning of quarter q.

P_k^M = the precompliance operating and maintenance expenditure incurred in month k.

PV = the present value of cash flow.

PV_{MCF_m} = present value of cash flow occurring in month m.

PV_{PCE} = present value of all cash flows resulting from the purchase and operation of the original and all future replacement cycles of pollution control equipment over the thirty-year time horizon.

PV_{DELAY} = present value of the costs of the original and all future cycles of pollution control equipment if compliance is delayed, as of the day compliance should have been achieved.

$PREF_m$ = the repayment of reallocation of preferred stock in month m.

$PREF_{FINAL}$ = repayment of outstanding preferred stock at the end of the thirty year time horizon.

$PRIN_m$ = the repayment of reallocation of debt in month m.

$PRIN_{FINAL}$ = repayment of outstanding debt at the end of the thirty year time horizon.

q = index indicating the quarter in which penalty payment is make.

Q = the fraction of common equity (at book value) in the owner's capital structure.*

r = the monthly rate of interest to be paid on post-compliance settlement amounts.*

R_{BOND} = the monthly interest rate on corporate or public utility bonds.*

R_{DIV} = the monthly dividend rate on preferred stock.*

R_{IDB} = the monthly interest rate in industrial development bonds.*

R_{INT} = the monthly rate of interest on long-term debt.*

S_k = the monthly equivalent of savings.

S_k^C = the monthly equivalent of the capital component of savings.

S_k^M = the monthly equivalent of the O&M component of savings.

SAVINGS = savings from delaying compliance.

$SAVINGS_{O\&M}$ = savings from forgone O&M expenditures during period of delay.

$SAVINGS_{CAP}$ = savings from delaying capital-related cash flows.

T = the number of quarterly payments.

t_{FED} = the marginal federal income tax rate.*

t_{ITC} = the adjusted investment tax credit rate.*

t_L = the marginal local income tax rate.*

t_S = the marginal state income tax rate.*

$t_{S\&L}$ = the marginal state and local income tax rate.*

t_{TR} = the marginal income tax rate.*

W_j = the fraction of common stock held by stockholder j.*

- = the fraction of the capital investment which has been made prior to the beginning of month k.*
- = the portion of the total operating and maintenance expense incurred during the period of noncompliance at a replacement source.*
- = the statutory investment tax credit rate.*
- = the actual post-compliance settlement to be paid or refunded.
- = the cumulative overpayment or underpayment of the penalty at the end of month k, including interest.
- = the total post-compliance settlement as of the date of compliance.

ATTACHMENT B

INVESTMENT TAX CREDIT QUALIFICATION

Only certain assets qualify for the investment tax credit. Most buildings are among the assets that do not qualify.[1] If the installation of pollution control equipment involves expenditures which will be capitalized and amortized over the tax life of the equipment, but which do not qualify for the investment tax credit, then the calculation of the credit must be adjusted.

Let II_{qual} be the investment which qualifies for the investment tax credit and let II be the total investment. If the investment tax credit rate and specified in the Internal Revenue Code is Y, the adjusted rate for use in the noncompliance penalty calculation is:

$$t_{ITC} = \frac{II_{qual}}{II} * Y$$

A further adjustment must be made if the investment is financed by the sale of tax-exempt industrial development bonds. If rapid amortization is used, only one-half of the credit can be taken on the investment. Investment projects partially financed by industrial development bonds and using rapid amortization receive an investment tax credit weighted to reflect the loss of one-half of the credit on the portion paid for by bonds. This is shown below:

[1] The Revenue Act of 1978 allows use of the investment tax credit for rehabilitation expenditures in connection with business and productive structures in use at least twenty years since first placed in service or since the last qualifying rehabilitation.

$$t_{ITC} = \left(1 - \frac{b}{2}\right) * Y$$

where: t_{ITC} = the adjusted investment tax credit rate.

b = the proportion of the investment financed by industrial development bonds and using rapid amortization.

Y = the investment tax credit rate specified in the Internal Revenue Code.

State investment tax credits should also be included in the investment tax credit rate. For example, Connecticut provides an investment tax credit for plants built in distressed areas. This tax credit lowers state taxes. Because state taxes are deductible from Federal taxes, only a portion of the credit benefits the firm. The total investment tax credit rate in states where the credit is based on actual investment is given by:

$$t_{ITC} = t_{ITC_{FEDERAL}} + \left[(1 - t_{TR_{FEDERAL}}) * t_{ITC_{STATE}}\right]$$

where: t_{ITC} = the adjusted investment tax credit rate.

$t_{ITC_{FEDERAL}}$ = the adjusted Federal investment tax credit rate.

$t_{TR_{FEDERAL}}$ = the marginal federal income tax rate.

$t_{ITC_{STATE}}$ = the adjusted state investment tax credit rate.

ATTACHMENT C

DEPRECIATION

The cash flow resulting from depreciation is given by:

$$DEP_m = d_m * II * t_{TR}$$

where d_m is the fraction of the original cost depreciated in month m and t_{TR} is the original income tax rate. The value of d_m will depend on the method of depreciation used by the owner of the facility. Formulae for deriving the fraction of the original cost depreciated in year j (D_j) are presented for the more common methods. The fraction of the original cost depreciated in month m, d_m, will be one-twelfth of the annual amount under each of these methods.

STRAIGHT LINE

Under this method, depreciation is the same during each year of the equipment's tax life (G).

$$D_j = \frac{1}{G}$$

where: G = the depreciation life of the pollution control equipment in years.

SUM OF YEARS DIGITS

Under this method, depreciation in year j is given by:

$$D_j = \frac{2 * (G-j+1)}{G * (G+1)}$$

DOUBLE DECLINING BALANCE

Under this method, depreciation in any year is the product of the remaining book value and twice the straight line rate. Switching to the straight line method is permitted after part of the asset has been depreciated. This switch, properly timed, increases the present value of the depreciation tax shield. The formula for double declining balance depreciation in year j is:

$$D_j = \max \begin{cases} \frac{2}{G} * (1 - \sum_{k=0}^{j-1} D_k) \\ \\ \frac{1}{G-j+1} * (1 - \sum_{k=0}^{j-1} D_k) \end{cases}$$

where "max" means that the greater of the two quantities to the right of the bracket should be chosen.

RAPID AMORTIZATION

A firm generally employs a depreciation method which minimizes the present value of its future income tax liability. This is accomplished by using the so-called accelerated depreciation methods, the most common of which are described above. Special rules governing the depreciation of pollution control equipment allow even faster writeoffs than the accelerated methods, often resulting in still greater reductions in the present value of future tax liability. This approach, known as

rapid amortization, was provided for in the Tax Reform Act of 1976.

The rules for rapid amortization are as follows:

- Divide the investment into two parts:
  - (1) the amount which would be depreciated during the first 15 years under straight line depreciation, and
  - (2) the residual.
- The first part may be depreciated on a straight line basis over 5 years.
- The second part may be depreciated over the full tax life of the investment using whichever depreciation method the owner chooses.

The formula for the fraction depreciated in year j is most easily developed by considering the two parts separately. The fraction in year j for the first part is given by:

$$D^1_j = \begin{cases} \frac{1}{5} * f, \text{ if } j \leq 5 \\ 0, \text{ if } j > 5 \end{cases}$$

where: $f = \min \left\{ \frac{15}{G} \right.$
$\left. 1 \right.$

The fraction of the second part depreciated in year j is given by the formula for straight line, sum of years digits, or

double-declining balance, depending on the method used. This must be multiplied by (1-f), the fraction of the initial investment in the second part.

$$D_j^2 = (1-f) * (\text{standard fraction based on depreciation method})$$

The total depreciation fraction for year j under rapid amortization is then given by summing the two components:

$$D_j = D_j^1 + D_j^2$$

ATTACHMENT D

TAX RATE ADJUSTMENTS

The calculation of the savings from noncompliance requires use of the firm's marginal income tax rate. For most large corporations operating in states with no state income tax, this figure would be 46 percent.[1] However, a state income tax or a non-corporate form of organization complicates the matter. This appendix discusses the adjustments necessary to deal with these two factors.

STATE AND LOCAL INCOME TAXES

Firms in some locations are subject to income taxation by more than one level of government. If state and local income taxes are deductible on the federal return, the rate of taxation on income, t_{TR}, must be computed according to the following procedure:

Let t_{FED} be the federal marginal tax rate and $t_{S\&L}$ be the rate on state and local returns. Taxes paid to state and local governments are deductible expenses on the federal return. Hence, this after-tax rate is given by:

$$t_{S\&L} * (1-t_{FED})$$

The overall tax rate is the sum of federal and state and local effects. It is given by:

$$t_{TR} = t_{FED} + \left[T_{S\&L} * (1-t_{FED})\right]$$

[1] As of January 1979.

It is possible that certain local income taxes will be allowed as deductions when state income taxes are computed. In such cases, $t_{S\&L}$ is given by:

$$t_{S\&L} = t_S + t_L * (1-t_S)$$

where: t_S = the marginal state income tax rate.
t_L = the marginal local income tax rate.

If the local income tax is not deductible from the state, the combined rate is given by:

$$t_{S\&L} = t_S + t_L$$

MULTIPLE OWNERSHIP, PARTNERSHIPS AND SOLE PROPRIETORSHIPS

The assumption in employing the tax rate, t_{TR}, and its components, t_{FED} and $t_{S\&L}$, is that these rates represent the marginal income tax rates applicable to the owning firm. If there is more than one owner, as might be the case if the firm were a partnership or a Subchapter S corporation, the rate used in the noncompliance penalty should be a weighted average of the rates appropriate to each owner. In the case of sole proprietorships, the tax rate will be the marginal income tax rate applicable to the individual owner.

The formula for either t_{FED} or $t_{S\&L}$ would then be given by:

$$t = W_1 t_1 + W_2 t_2 + \cdots + W_k t_k$$

$$= \sum_{k=1}^{K} W_k t_k$$

where: t = the weighted average marginal income tax rate.

W_k = the fraction owned by the k^{th} owner.

t_k = the marginal income tax rate of the k^{th} owner.

K = the number of owners.

ATTACHMENT E

WEIGHTED AVERAGE INTEREST RATE

The interest rate used in the formulae is the marginal rate of interest which would be paid by the firm if additional debt were acquired. If Industrial Development Bonds (IDB's) are not used, this rate is simply the most recent average yield on corporate bonds of a grade equal to that on the firm's bonds having the highest rating. If the firm expects to use IDB's to finance all or a portion of its investment in pollution control equipment, a weighted average of the corporate (or public utility) bond rate and the IDB rate will be used as the interest rate in the model.

The weighted average interest rate will equal:

$$R_{INT} = \frac{IDB}{B^*II} * R_{IDB} + \left(1 - \frac{IDB}{B^*II}\right) * R_{BOND} \qquad \text{for } IDB \leq B^*II$$

Where:

R_{INT} = the monthly weighted average interest rate (expressed a decimal fraction).

IDB = the dollar value of issued industrial development bonds.

B*II = the amount of the initial investment financed by debt.

R_{IDB} = the monthly equivalent of the interest rate on industrial development bonds (expressed as a decimal fraction).

R_{BOND} = the monthly equivalent of the interest rate on corporate or public utility bonds (expressed as a decimal fraction).

If the dollar value of industrial development bonds issued to finance the pollution control equipment exceeds the amount of the initial investment, the interest rate used in the formulae will be set equal to the interest rate on industrial development bonds. Thus:

$$R_{INT} = R_{IDB} \qquad \text{for } IDB > B^*II$$

ATTACHMENT F

FACILITIES WITH LIMITED USEFUL LIVES

In some cases, a noncomplying source of emissions will not be brought into compliance but instead will be retired or replaced by a complying source. For example, a steel company with a noncomplying open hearth furnace may wish to retire that furnace rather than bring it into compliance, and may replace its steelmaking capability with a basic oxygen furnace. The basic oxygen furnace would have sufficient emission controls to allow it to meet the standards for new sources.

If the firm wishes to operate a noncomplying source for a limited period of time and then retire that source, the noncompliance penalty is calculated based on the capital and operating and maintenance costs which would have been incurred in bringing the source into compliance. These are the costs which are foregone in continuing to operate the noncomplying source and are the basis of the savings which accrue to the owner in so doing. Since the source is never brought into compliance, there are no precompliance expenditures. The full capital cost of compliance is assumed to be incurred in the final month before retirement.

When the firm plans to replace a noncomplying source with a new facility after some period of noncompliance, a similar approach is used. The basic calculation is based on the costs that would have been incurred in bringing the older source into compliance. However, an adjustment is then made for the precompliance expenditures made on the new complying facility. In other words, expenditures made on the construction of the new source are used to adjust the penalty much the same as precompliance expenditures on the older source would be used if they occurred. This procedure is explained below.

The basic equations utilized in the consideration of precompliance expenditures were detailed in Section V. These equations begin by breaking the savings equivalent into its capital and operating and maintenance components. The capital component is then adjusted for precompliance expenditures as shown in equation (48):

$$A_k^C = (1-X_k^C) * S_k^C \qquad (48)$$

where: A_k^C = adjusted capital component in month k

X_k^C = fraction of total capital investment made prior to the beginning of month k

S_k^C = unadjusted capital component in month k

In the case of a firm replacing an older noncomplying facility with a new source which meets the emission standards, the equation above would be used with X_k^C based on the total investment (for both productive capacity and pollution control equipment[1]) in the new facility and S_k^C based on the capital costs of bringing the old source into compliance. As such, X_k^C would represent the fraction of the total investment required for the new facility expended prior to the beginning of month k.[2]

[1]Both production and pollution control expenditures are considered because in this case technology substitution itself as well as control equipment contribute to meeting the emission standards.

[2]The value of X_k^C cannot exceed one.

The adjusted value of the operating and maintenance component -- A^M -- is equal to the amount which would have been spent at the old source in complying adjusted for the portion of the total operating and maintenance expenses of the equipment at the new source made during the period of noncompliance. The equation for adjusting operating and maintenance expenditures is written as:

$$A^M = (1-X^M) * SAVINGS_{O\&M} \qquad (49)$$

where: A^M = adjusted operating and maintenance component of the penalty.

X^M = the present value of the operating and maintenance precompliance expenditures made during the period of noncompliance at the new source divided by the present value of the total operating and maintenance expense of the new source had it been in operation during the period of noncompliance.[1]

$SAVINGS_{O\&M}$ = the present value of the operating and maintenance expense of the old source had it been in compliance during the period of noncompliance; that is, the savings from forgone O&M expenditures during the period of delay.

As described above, noncompliance penalties for facilities with limited useful lives are based on the costs which would have been incurred in bringing the facility into compliance. Because the source is retired rather than brought into compliance, no post-compliance settlement based on the capital and operating and maintenance costs actually incurred is possible. However, if

[1]The value of X^M cannot exceed one.

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the noncomplying source is replaced with a new facility, the noncompliance penalty is adjusted based on planned precompliance capital and operating and maintenance expenditures. In such cases, a post-compliance settlement is possible and necessary to adjust for differences between planned versus actual precompliance expenditures and the resulting alterations in the noncompliance penalty. The estimates of the discount rate, the inflation rate, and the firm's capital structure are also updated at the time. Such a settlement involves three steps:

- The actual capital and operating and maintenance expenditures for each month are converted to dollars as of the date of noncompliance.
- Each monthly constant dollar capital expenditure's percentage of the total capital expenditure is calculated. The percentage of the total operating and maintenance expenditures made during the period of noncompliance is also calculated.
- The percentages of total capital expenditures and total operating and maintenance expenditures made during the period of noncompliance are used to adjust the respective penalty components computed in the initial penalty calculation.

The formulae are identical to those shown in Section V for the post-compliance settlement.

ATTACHMENT G

APPLICATION TO GOVERNMENT FACILITIES

The noncompliance penalties described in this document are designed to remove the economic savings realized by a firm due to delayed compliance with pollution control requirements. Similar savings are realized by government-owned facilities -- emission sources owned or under the control of municipal, state, federal and other government and quasi-government entities. The statute contemplates that noncompliance penalties will be assessed against such facilities as well.

The calculation of penalties for government facilities is carried out using the same general logic as presented in this document with two important changes:

1. Cash flows due to tax effects are no longer relevant.
2. A discount rate appropriate for use with government projects is used.

Each of these changes is described below.

TAX EFFECTS

Because government facilities do not pay income taxes, cash flows which result from tax effects in the private sector are not included in the noncompliance formulae for government facilities. As a result, cash flows due to tax savings from depreciation, interest expense, and operating and maintenance expense are not included in the formulae for government noncompliance penalties. The replacement of t_{ITC} and t_{TR} with zero in all formulae developed in Section V will accomplish this change.

DISCOUNT RATE

The choice of a discount rate for use in analyzing government investments has been a widely debated subject for a number of years. One commonly held view is that the appropriate discount rate for evaluating government investments is the rate of return that the resources utilized would have provided in the private sector.[1] The correct discount rate is, therefore, the opportunity cost of funds in the private sector. This rate is extremely difficult to estimate since it involves calculating the weighted average of the rates of return in various productive sectors of the economy from which resources are withdrawn for the government investment under consideration.

For the purpose of noncompliance penalties, the discount rate of 10 percent specified by the Office of Management and Budget (OMB) for use in federal project analysis is utilized.[2] OMB argues that the discount rate of 10 percent represents an estimate of the average rate of return on private investment. This discount rate is often used by government, particularly in analysis of investments that will receive partial or full federal funding. Thus, use of this rate will insure that the calculation of noncompliance penalties for government facilities is accomplished on the basis consistent with the analysis of investments carried out by government decision makers.

[1] See, for example, William J. Baumol, "On the Discount Rate for Public Projects," Public Expenditure & Policy Analysis, Robert H. Haveman and Julius Margolis, eds., Rand McNally Publishing Company, 1977, pp. 161-79.

[2] OMB Circular A-94.

All cash flows in the noncompliance formulae should be discounted using the 10 percent discount rate. In order to accomplish this using the formulae derived in Section V, the variables P (preferred stock share) and B (debt share) should be set equal to zero and the variable Q (the equity share) should be set equal to one. The variable E is redefined to be the government discount rate and should be set equal to 10 percent. These changes and those in the tax rate variables described above result in the following cash flow values for government facilities.

$$\text{INITIAL}_0 = \text{II} * 1 \qquad (3)$$

$$\text{MONTHLY CAPITAL RELATED}_m = 0 \qquad (19)$$

$$\text{O\&M}_m = M_0 * (1+i)^m \qquad (21)$$

Thus, the cash flows resulting from the purchase and operation of pollution control equipment each month for a government facility is the sum of these contributions:

$$\text{MCF}_m = \text{INITIAL}_m + \text{O\&M}_m \qquad (25a)$$

Equation (25a) can be substituted for equation (25) in the subsequent formulae derivation presented in Section V.

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Discounting all the cash flows associated with non-compliance at the 10 percent discount rate is theoretically correct for government-funded projects. Some government-owned entities, however, may more closely resemble private corporations in the manner in which they raise and repay their capital. All government-owned entities will be treated in the manner described in Attachment G unless the source being considered demonstrates by providing appropriate data that either the debt-equity ratio or the discount rate or both is inappropriate and therefore that the exception provided by Attachment G should not apply to the entity in question.

APPENDIX B

CLEAN AIR ACT
SECTION 120
NONCOMPLIANCE PENALTIES
INSTRUCTION MANUAL

CONTENTS

I. Introduction

II. Data Requirements and Data Sources

III. Using the Computer Program

IV. Calculation of the Post-Compliance Settlement

V. Special Conditions

SECTION I

INTRODUCTION

This appendix describes the procedures used to calculate the noncompliance penalty imposed by the 1977 amendments to the Clean Air Act (the Act). The penalty, stipulated under Section 120 of the Act, removes the economic benefits which accrue to a firm from delaying investment in pollution control.

The economic benefits of a delay in the installation of pollution control equipment has two components. First, the firm benefits by delaying the capital expenditure needed for pollution control. The firm can earn a return on the capital costs of the pollution control equipment whose purchase has been delayed. The second component of the economic benefit is the operating and maintenance costs avoided as a result of not having installed the equipment and the return on expenditures avoided.

IMPLEMENTING THE NONCOMPLIANCE PENALTY

A detailed discussion of the economic rationale for the noncompliance penalty and the computational method used is contained in Appendix A, the Technical Support Document. This appendix is designed to aid the user in determining the appropriate data for calculating the penalty and to describe the computer program which performs the actual computation.

To the extent practicable, the computer program has been written to accept data as it appears in the source. However, it is necessary in some instances to adjust the data for entry. When this adjustment requires several computations, a worksheet has been provided.

LEVEL OF KNOWLEDGE REQUIRED

The appendix has been written on the assumption that the user has had little formal training in business finance. Use of this manual and the computer program do not require a knowledge of the mathematical formulae in the Technical Support Document. It is assumed, however, that the reader is familiar with the discussion sections in the Technical Support Document.

PLAN OF THE DOCUMENT

Section II describes the sources of data needed to calculate the penalty and how the various data items are converted to a form suitable for entry into the computer program. As an aid in exposition, a hypothetical noncomplying firm is described and relevant penalty calculations are illustrated.

Section III describes the procedures necessary to operate the computer. An example of an actual use of the program to calculate a penalty is included. This example will utilize data calculated in Section II.

Section IV describes the calculation of the post-compliance settlement based on data used in Sections II and III.

Section V discusses the calculation of the penalty under special conditions. These conditions include investments financed with industrial development bonds, penalties for limited life facilities, and penalties for government facilities.

SECTION II

DATA REQUIREMENTS AND DATA SOURCES

Calculation of the noncompliance penalty requires a substantial amount of financial data. It is expected that most of this data, as well as the calculation itself, will be provided by the firm. This is in accordance with Section 120 of the Clean Air Act which will:

> "...require each person to whom is given under paragraph (3) to --
>
> > (A) calculate the amount of the penalty owed (determined in accordance with subsection (d)(2)) and the schedule of payments (determined in accordance with subsection (d)(3)) for each such source and, within forty-five days after the issuance of such notice or after the denial of a petition under subparagraph (B), to submit that calculation and proposed schedule, together with the information necessary for an independent verification thereof, to the State and to the Administrator."

However, some firms may not comply with the requirement. Section 120 further stipulates that if the firm fails to submit a calculation of the penalty, the State or the Administrator may contract with a third party to determine the penalty payments. This will require collection of data from several public sources. This section discusses the method used to collect data and prepare it for the calculation of the penalty.

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CASE STUDY

As an aid to understanding the issues discussed in this and the next section, an example has been formulated involving a hypothetical fertilizer company. While this case will utilize data from an actual corporation, the firm is not in the fertilizer industry. The example was created to illustrate many of the features of the computer program and thus may be more complex than many "real life" situations. Data prepared in the case discussion below will be entered in the computer program to determine a penalty in Section III.

THE FERTILIZER COMPANY

On August 31, 1979, the Fertilizer Company was issued a notice of noncompliance with Section 120 of the Clean Air Act.[1] The source of emissions was an incinerator used for the disposal of a waste byproduct from the manufacture of the firm's most profitable product.

A preliminary engineering study had been performed in which it had been determined that compliance could be reached with an investment of $500,000. The investment would involve the purchase of a baghouse and modifications to the firm's incinerator in order to reduce particulate emissions.

In addition to the capital investment, it was estimated that $15,000 in operating and maintenance expense would be needed each year the pollution control equipment was operated. It was also estimated that $1,890 in precompliance maintenance expense was necessary to make the equipment operational.

[1] This example is for purposes of illustration only. In actuality, no notice of noncompliance will be issued prior to January 1, 1981.

Engineers for the Fertilizer Company believed that it would be at least nine months before the equipment was installed and shake-down was completed. Because the waste could be safely stored for short periods, production of fertilizer would not be interrupted while the incinerator was being modified.

The Fertilizer Company is a publicly-owned corporation with assets of $770 million. The company is mainly financed with investment by the common stockholders but some preferred stock and long term debt also exists.

The firm, in accordance with the Act, had computed the penalty owed and a schedule of payments. It had also submitted the data used in calculating the penalty. The enforcement official now had to arrange the data in the order it would be requested by the computer and verify that it was from an appropriate source. The computer program would check the accuracy of the firm's penalty calculation.

PREPARING DATA FOR ENTRY INTO THE PROGRAM

The computer program will request data in a specific sequence. Although the data submitted by the firm can be verified in any order, it is useful to verify the data in the same way so that omissions are avoided. The following paragraphs follow the same sequence as is used to enter data into the computer program.

Initial Penalty Calculation or Post-Compliance Settlement

The program can be used to calculate both the initial penalty when the notice of noncompliance is received and the post-compliance settlement after compliance has been achieved. In the example of the Fertilizer Company, the initial penalty will be calculated in Section III and the post-compliance settlement will be calculated in Section IV.

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Limited Life Facility

The program calculates a penalty based on eventual compliance at the source. However, some firms will attain compliance by shutting down the source or by replacing it with a new source. This option is discussed in detail in Section V. For the Fertilizer Company, the source is not a limited life facility.

Industrial Development Bonds

The calculation of the percentage of a pollution control investment financed by tax-exempt industrial development bonds is discussed in Section V. For the Fertilizer Company, none of the investment is financed by issuing tax-exempt bonds.

The Number of Months the Source Will be Out of Compliance

The period of noncompliance is measured from the first day of the month following the month in which the notice of noncompliance is issued until the month standards are actually met. This will include installation time and shakedown period for the equipment. The firm is assumed to be in compliance during the entire month in which compliance is finally achieved. In the Fertilizer Company example, the firm stated that it will come into compliance in nine months.

Schedule of Capital Investments

This is an estimate, provided by the firm, of monthly capital expenditures for the purchase and installation of the pollution control equipment. It is assumed that all capital expenditures are completed when compliance is achieved.[1]

[1]If a portion of the capital expenditures are expected to be incurred after compliance is achieved, these expenditures should be added to the capital expenditures made in the final month before compliance is achieved.

The sources which firms will use to estimate monthly expenditures include engineering estimates, quotations from manufacturers, or estimates by management. They will consist of not only the direct purchase cost, including sales taxes, but also site preparation, engineering design work, shipping costs and installation expense. In addition, the value of lost production due to downtime of production equipment should be included. These temporary losses of productive capacity are included in capital expenditures. Permanent losses of productive capacity are included in operating and maintenance expenditures. All costs must be stated in terms of the actual expenditures the firm expects to make each month.

The Fertilizer Company estimated that the total expenditure needed was $500,000. It submitted the data in Exhibit II-1 to justify the estimate. Expenditures to the manufacturer for the equipment will be made in three equal installments, during the second, fourth, and ninth months of noncompliance. Each payment will be $166,666.67 ($500,000 divided by 3).

Schedule of Precompliance Operating and Maintenance Expenditures and Post-Compliance Monthly Operating and Maintenance Expense

These are costs the firm will incur for operation of the equipment to be installed.[1] They may include operating and supervisory labor, power for equipment operation, supplies necessary for operation and a portion of the firm's overhead. If a byproduct is created during equipment operation, disposal costs are included as an operating expense. If the byproduct can be sold or used in another process, the value of the byproduct should be subtracted from operating and maintenance expense.

[1]This should not include any operating and maintenance expenditures incurred in operating pollution control equipment installed proir to the date the notice of noncompliance is received.

EXHIBIT II-1

CALCULATION OF THE CAPITAL EXPENDITURE INPUT[1]
FERTILIZER COMPANY

1.	List price or estimated price of the equipment:	$485,903.65
2.	Less: Discount from manufacturer:	9,718.17
3.	Equals net price of equipment:	476,190.48
4.	Plus: Sales tax on equipment:[2]	23,809.52
5.	Plus: Freight and delivery charge:	0
6.	Plus: Installation charge:	0
7.	Equals estimated cost of equipment installed:	$500,000.00
8.	Plus: Value of lost production:	0
9.	Plus: Cost of building modifications:	0
10.	EQUALS TOTAL CAPITAL EXPENDITURE:	$500,000.00

Note: Line 7 divided by line 10 is the percentage of qualified investment for calculation of the investment tax credit.

QUALIFIED PERCENTAGE INVESTMENT TAX CREDIT:

$$\frac{\text{Line 7}}{\text{Line 10}} = \frac{\$500,000}{\$500,000} \times 10^{*} = 10\%$$

[1]This calculation uses Worksheet A in Attachment V.

[2]Some corporations subtract sales tax from revenue in the year of purchase. If this is the case, the sales tax is multiplied by (1 - Tax Rate) and subtracted from the cost of the equipment rather than added as in step four.

*If the depreciable life of the equipment is less than seven years, this figure must be adjusted as described on page II-16.

In addition, operating and maintenance should include the incremental cost of changing plant operations to conform to the Act. For example, a firm forced to shift from high sulfur coal to low sulfur coal would include the increase in fuel costs as an operating expense. Operating expense would also include the additional cost incurred if compliance requires shifting production to a less efficient or more expensive method. Hence, permanent losses in productive capacity which will be incurred as a direct result of operating the pollution control equipment should be counted as an expense in this category.

Sources for operating and maintenance expense are engineering reports, manufacturer specifications, estimates by owners or actual data from similar operations. Two different estimates of operating and maintenance expense are necessary -- those incurred before compliance and those estimated for the period after compliance. These amounts should be stated as the actual expense the firm would expect to incur in each month before compliance and the average monthly expense which will be incurred after the firm comes into compliance.

The Fertilizer Company supplied the data in Exhibit II-2 as estimated precompliance operating and maintenance expense. For post-compliance operating and maintenance expense the Fertilizer Company supplied the data in Exhibit II-3.

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EXHIBIT II-2

ESTIMATE OF MONTHLY PRE-COMPLIANCE
OPERATING AND MAINTENANCE EXPENSE
FERTILIZER COMPANY

PRE-COMPLIANCE OPERATING EXPENSE		
Months 1-6		$ 0
Month 7		
Labor (10 hours @ $10)	$ 100.00	$ 100.00
Month 8		
Labor (100 hours @ $10)	1,000.00	
Power (1500 Kwh @ .0333 kwh)	50.00	
TOTAL		$1,050.00
Month 9		
Labor (50 hrs @ $10)	500.00	
Power (7200 Kwh @ .0333 kwh)	240.00	
TOTAL		$ 740.00

EXHIBIT II-3

POST-COMPLIANCE ANNUAL OPERATING AND MAINTENANCE EXPENSE[1]
FERTILIZER COMPANY

1.	Annual Labor Expense	
	840 hours x $10 per hour =	$8,400.00
2.	Power Cost	
	90090 Kwh x $.0333 per Kwh =	3,000.00
3.	Water Cost	
	Gallons x $ per gallon =	0
4.	Raw Materials and Supplies	
	1000 lbs. x $1 per lb. =	1,000.00
5.	Yearly Increase in Property Tax =	3,000.00
6.	Cost of Production Lost Due to Maintenance or Use of Equipment =	0
7.	TOTAL COST (1 + 2 + 3 + 4 + 5 + 6) =	$15,400.00
8.	Less: Value of Byproducts	
	800 lbs. @ $.50 per lb. =	400.00
9.	Annual Operating and Maintenance (7 - 8) =	$15,000.00
10.	AVERAGE MONTHLY OPERATING AND MAINTENANCE (9÷12) =	$1,250.00

[1] This calculation uses Worksheet B in Attachment V. All expenses should be stated in dollars as of the date the firm comes into compliance.

Investment Tax Credit Rate[1]

The investment tax credit is a percentage of the investment which can be used to directly reduce federal income tax. Although the federal tax credit for an investment is currently ten percent, this rate may have to be adjusted to reflect two restrictions in the revenue code:[2]

- Investments of less than seven years do not receive the entire ten percent.
- Certain investments do not qualify for the credit.

An investment with a depreciable life of less than seven years does not qualify for the maximum investment tax credit. Currently, percentages allowed for such investments are as follows:

Depreciable Life (years)	Investment Tax Credit (percent)
Less than 3	0
At least 3 but less than 5	3.33
At least 5 but less than 7	6.67
7 or more	10.00

[1]Information on the investment tax credit is contained in the Internal Revenue Service Code, Chapter 1, Subpart B -- Rules for Computing Credit for Investment in Certain Depreciable Property.

[2]In addition to the two listed restrictions, investments financed with industrial development bonds qualify for only a portion of the credit when rapid amortization is used. This adjustment is made automatically by the computer program. Further, for the purposes of noncompliance penalties the entire investment tax credit as calculated is used regardless of the taxable income amount.

Items such as buildings and land are not usually allowable for purposes of computing the investment tax credit, so the percentage rate must be adjusted to yield a correct tax credit figure.[1] This adjustment is made by calculating the percentage of the investment qualifying for the tax credit and multiplying it by the percentage tax credit for equipment of similar depreciable life.

State investment tax credits should also be included in the investment tax credit rate. For example, the State of Connecticut allows an investment tax credit to be applied against state taxes if the investment occurs in certain depressed areas. Because this credit reduces a tax deductible expense for federal income taxes, the credit must be adjusted to an after-tax basis. The adjustment is made by multiplying the state investment tax credit by one minus the marginal federal tax rate. The adjusted state credit is then added to the federal credit.[2]

For the Fertilizer Company, the entire investment qualifies for the investment tax credit. If $150,000 of the investment had not been qualified, only a seven percent credit would be allowed.[3]

[1]The Revenue Act of 1978 allows an investment tax credit for rehabilitation expenditures in connection with business and productive structures in use at least twenty years since first placed in service or since the last qualifying rehabilitation. Thus, the adjustment described above should be ignored for qualified rehabilitation investments.

[2]The formula for determining the investment tax credit in a state having a tax credit is:

$$t_{ITC} = ITC_{FEDERAL} + (1\text{-Tax Rate}_{FEDERAL}) * ITC_{STATE}$$

[3]Computed as $\frac{(\$500,000 - 150,000)}{500,000} \times 10\% = 7\%$

If the Fertilizer Company had a depreciation tax life of five years and the entire investment qualified for the investment, only a 6.67 percent credit would be allowed.

Income Tax Rate

The income tax rate to be entered into the program must be the marginal rate -- that is, the rate which the firm would pay on an additional dollar of income. The firm must estimate its marginal federal income tax rate and, where applicable, its marginal state and local tax rates. The state and local tax rates should not include sales tax, inventory tax, charter tax or taxes on property. If any of these taxes are material to the analysis, they should be included in either the investment or operating and maintenance expenditures, as appropriate. Sales tax has already been shown to increase investment while property taxes would be included in operating and maintenance expense.

In most cases involving large firms, the marginal tax rate will be 46 percent.[1] Small corporations and some partnerships or privately-owned firms could have lower rates. In many penalty calculations it will be necessary to adjust the state and local tax rates to reflect the fact that the state and local income taxes are also deductible from federal taxes. The steps for calculation are as follows.

[1]As of January 1979. This rate must be adjusted for future changes in the tax laws.

The rate applicable to a firm is determined by the amount of taxable income expected in the next year. The ranges of taxable income and the corresponding marginal tax rate are shown below.

Taxable Income	Marginal Tax Rate
$0 - $25,000	17%
$25,000 - $50,000	20%
$50,000 - $75,000	30%
$75,000 - $100,000	40%
$100,000 and above	46%

- The marginal federal, state and local income tax rates are determined.
- The adjusted local tax rate given state taxes is computed.[1]
- The local and state tax are adjusted for the federal tax.
- The effective tax rate is computed.

Exhibit II-4 contains a calculation of the tax rate for the Fertilizer Company.

Inflation Rate

This is the estimated future increase in the capital and operating cost of pollution control equipment.[2] The inflation rate to be used in the Fertilizer Company penalty calculation is 7.2 percent. This was the compound annual rate of increase in the Chemical Engineering Plant Cost Inflation Index for the period July 1974 to July 1979.[3]

[1]If the local tax is not deductible from the state tax, the numbers should be added.

[2]Chemical Engineering, McGraw Hill, Inc., April 28, 1975 and subsequent issues. The compound rate of increase is computed as:

$$\left[\frac{\text{(Index in Final Month)}}{\text{(Index in Initial Month)}}\right]^{1/N} - 1 \quad \times 100$$

where N equals the number of years between the first and last months.

[3]The inflation rate of 7.2 percent is only applicable to the example described in the manual. Actual penalty determination will require calculation of the inflation rate using the above formula and the Plant Cost Inflation Indices for the most recent month and the month five years prior to the most recent month.

EXHIBIT II-4

CALCULATION OF THE TAX RATE[1]
FERTILIZER COMPANY

1.	Marginal Federal tax rate	46%
2.	Marginal State tax rate	5%
3.	Marginal Local tax rate	2%

CALCULATION OF ADJUSTED LOCAL TAX

(1 - State Tax Rate) x Local Tax Rate

= (1 - .05) x .02

= .95 x .02

= .019 = Adjusted Local Tax Rate

CALCULATION OF ADJUSTED STATE AND LOCAL TAX

(1 - Federal Tax Rate) x (State Tax Rate + Adjusted Local Rate)

= (1 - .46) x (.05 + .019)

= .54 x .069

= .0373 = Adjusted Local and State Tax

CALCULATION OF TAX RATE

100 x (Federal Tax Rate + Adjusted Local and State Tax)

= 100 x (.46 + .0373)

= 100 x .4973

= 49.73 = Tax Rate

[1] This calculation uses Worksheet C in Attachment V.

Discount Rate

The discount rate is an estimate of the firm's cost of new equity capital. For a manufacturing firm, calculation of the discount rate requires averaging the twenty most recent quarters of the after-tax return on equity as reported for the firm's industry and for all manufacturing corporations in Table 4 of the Federal Trade Commission's Quarterly Financial Report for Manufacturing, Mining and Trade Corporations. Attachment I contains a copy of Table 4 for the first quarter of 1979. The higher of the industry average rate of return on equity or the all-manufacturing rate of return on equity is used as the discount rate.

The annual rates of return on equity after taxes are reported by the FTC in broad industrial categories. To categorize a firm, the Standard Industrial Classification Manual, published by the Office of Management and Budget, should be used.[1]

The FTC does not report rates of return on equity for public utilities. For these organizations, the annual percent return on net worth published in the April Monthly Economic Letter by Citibank (New York) should be used as the discount rate. Attachment I includes a table listing this information for 1975 to 1979.

For the Fertilizer Company, the correct industrial category to use is Chemicals and Allied Products. The calculation of the average return on equity for twenty quarters is shown in Exhibit II-5. Since the 15.91 percent rate of return for

[1] If the firm is a subsidiary of a larger corporation, the SIC category used should be the category appropriate for the smallest entity with audited financial statements which includes the source not in compliance.

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EXHIBIT II-5

FERTILIZER COMPANY
JULY 1978
AVERAGE RETURN ON EQUITY, CHEMICALS AND ALLIED PRODUCTS

Year	Quarter	Return on Equity (%) Chemicals & Allied Products	All Manufacturing
1974	2	21.3%	16.7%
	3	19.0	15.4
	4	14.8	13.2
1975	1	14.0	9.0
	2	16.1	11.8
	3	15.5	12.4
	4	15.2	13.1
1976	1	16.6	13.3
	2	17.2	15.7
	3	15.3	13.7
	4	12.8	13.1
1977	1	14.9	13.0
	2	16.8	16.0
	3	14.8	13.3
	4	13.8	14.4
1978	1	14.3	12.4
	2	16.7	16.6
	3	15.2	14.9
	4	16.3	16.1
1979	1	17.6	15.7
TOTAL		318.2	279.8
AVERAGE		15.91%	13.99%

Chemicals and Allied Products exceeds the average rate of return of 13.99 percent for all manufacturing corporations, the discount rate used is 15.91 percent.

Interest Rate

The interest rate is the current cost of new debt for the firm.[1] Determination of the firm's interest rate requires two steps.

- The quality rating for the firm's bonds is found in Moody's Bond Record. If the firm does not have rated debt, an "A" rating is assumed. If it has more than one issue, that with the highest rating is used.
- The most recent yield reported for bonds of the same rating is found in the Corporate Bond Yield Averages section of the Bond Record.

Bonds are rated by Moody's in a system ranging from a high of "Aaa" to a low of "C." The lowest average yield reported is "Baa;" a firm whose bonds have a rating of "Baa" or lower will use the yield reported for the "Baa" average. The bonds are listed in the Bond Record in alphabetical order by corporation. Convertible bonds are considered in the same manner as all other bonds.

[1] This discussion assumes that Industrial Development Bonds (IDB's) are not used. If IDB's are sold to finance the pollution control investment, see Section V.

Note that the interest rate is not taken from the so-called coupon rate on the bond. For example, in Exhibit II-6, rates of 9.75 percent and 4.5 percent are listed. These are historical rates which were in affect at the time the bonds were issued. They do not reflect current market rates.

The Bond Record reports a number of different yields. If the firm is a utility, the Public Utility Average is used. If the firm is not a utility, the Industrial Bond Average is used.

For the Fertilizer Company, the debt was not rated, so the most recent yield reported for the industrial "A" bonds is used (9.75%). Attachment II contains the average bond yields as reported in a recent issue of the Bond Record.

Preferred Dividend Rate

The method used for determining the preferred dividend rate is identical to that used to select the interest rate. The quality rating of the firm's preferred shares is found in Moody's Bond Record in the Preferred Stock section. If the stock is not rated, an "a" rating is assumed.

Average yields are reported for only "aa", "a", and "baa" preferred stocks issued by utilities. However, these figures should be used for non-utility firms as well. If the stock has a rating of "baa" or lower, the firm should use the "baa" average yield. Firms with preferred stock rated "aa" or

higher should use the "aa" yield. The latest monthly average is used and entered exactly as shown in the averages. Attachment III contains an example of the Bond Record preferred averages.

The Fertilizer Company's preferred stock is not rated so the yield entered for the penalty calculation is 9.60 percent, the rate found by using the return on "a" rated preferred stock.

Equity Share of Investment

This is the percentage amount of equity in the firm's capital structure. The capital structure of the firm is the dollar amount invested in the firm for periods over one year. Thus it does not include current liabilities or deferred federal income tax.

The equity share of the investment is calculated using data contained in the firm's five most recent annual reports.[1] The procedure involves the following steps:

[1] This is available either directly from the firm or, for large corporations, in Moody's Industrial Manual. An advantage to using Moody's is that the percent equity is reported and can be used as a check on the calculation.

If the firm does not have five years of annual reports, a shorter period of time may be used. For firms without audited financial statements, the fraction of preferred stock, debt, and equity used in the penalty calculation will be the five year average preferred stock, debt, and equity share for the firm's industry. This can be calculated from the financial statements provided for the industry by the Federal Trade Commission in its Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations.

Firms which are subsidiaries of a larger corporation should use the financial statements of the smallest entity with audited financial statements which includes the source not in compliance.

- Step 1. The sum of all the firm's equity accounts on each year's balance sheet is added to the total of its long term debt. This total represents the firm's long term financing or its capital structure for that year. It will include paid-in capital, retained earnings, capital surplus, preferred stock, and long term debt. If Treasury stock is shown as an asset on the balance sheet, it should be subtracted from the total capital.

- Step 2. The dollar amount of all equity accounts except preferred stock shown in the equity section of the balance sheet for the year is divided by the total capital found in the previous step. This is the equity share of the investment for the year.

- Step 3. The equity shares for each of the five most recent years are averaged to yield a equity share for input to the penalty calculation.

Preferred Stock Share of the Investment

The computation of the preferred stock share of the investment is analogous to the computation of the equity share of the investment, as described above. The sum of all preferred stock accounts is divided by the total capital computed in Step 1 above for each of the five most recent years. These figures are then averaged to yield a preferred stock share for input to the penalty calculation.

Debt Share of the Investment

The sum of all long-term debt accounts is the amount of debt in the capital structure each year. This sum is also divided by the yearly total capital found in Step 1 above yielding the debt share of the investment for the year. These figures are then averaged to yield a debt share for input to the penalty calculation.

The sum of the equity share, the debt share, and the preferred share of the investment must equal one hundred percent.

The balance sheet of the hypothetical Fertilizer Company is shown in Exhibit II-6. Exhibit II-7 illustrates the calculation of the equity, preferred stock, and debt share of the investment for a single year.

Depreciation Life in Years

This is the number of years over which the firm's pollution control equipment will be depreciated for tax purposes. It is found by taking the lower limit on the asset depreciation range for the appropriate class of assets given in the Internal Revenue Service publication Revenue Procedure 77-10. If the lower limit is greater than ten years, the Clean Air Act requires that ten years be used. If the lower limit contains a fractional part of a year, the program should be run with the year lower than the fraction. If the rounding reduces the investment tax credit, the depreciation life should be rounded up and the program run again. The calculation giving the lower penalty should be used. For the Fertilizer Company example, the lower limit on the asset depreciation range for chemicals and allied products is used. This is nine years. Had it been 8.5 years, it would have been rounded down to 8 years.

The Useful Life in Years

The useful life is used to determine the length of each replacement cycle in the penalty calculation. It is also provided by Revenue Procedure 77-10. Instead of using the lower limit, the asset guideline period is used. If this contains a fractional

EXHIBIT II-6

FERTILIZER COMPANY
BALANCE SHEET
December 31, 1978
(000's)

ASSETS		LIABILITIES	
Cash	$ 18,881	Notes Payable to Bank	$ 122
Marketable Securities	60,552	Accounts Payable & Accruals	54,109
Notes & Accounts Receivable (Net)	79,156	Preferred Dividends Payable	23
Income Tax Refunds		Income Tax	28,335
Inventories	116,940	Current Maturities Long Term Debt	8,929
Prepaid Expenses	4,290		
TOTAL CURRENT ASSETS	$279,819	TOTAL CURRENT LIABILITIES	$ 91,518
Property, Plant and Equipment	828,703	Deferred Federal Income Taxes	57,563
Less: Reserve for Depreciation	423,554	4.5% Debentures	21,531
		9.75% Notes	60,000
NET PROPERTY ACCOUNT	$405,149	Long Term Lease Oblibation	43,932
		Pollution Control Facility Revenue Bonds	46,000
Construction Funds Held by Trustee	3,913	Other Long Term Debt	9,230
Other Assets	83,495	4.5% Preferred Stock ($100 par)	22,044
		Common Stock ($5 par)	100,000
		Capital Surplus	58,236
		Retained Earnings	262,799
		TOTAL STOCKHOLDERS' EQUITY	$443,079
		Less: Treasury Stock	477
		NET STOCKHOLDERS' EQUITY	$442,602
TOTAL ASSETS	$772,376	TOTAL LIABILITIES AND NET WORTH	$772,376

EXHIBIT II-7

CALCULATION OF THE EQUITY, DEBT AND PREFERRED SHARE OF THE INVESTMENT[1]
FERTILIZER COMPANY
(000's)

The first step in obtaining the equity, debt and preferred share of the investment is to sum the equity and long term debt.[2]

4.5% Debentures	$ 21, 531
9.75% Notes	60,000
Long Term Lease	43,932
Pollution Control Revenue Bonds	46,000
Other Long Term Debt	9,230
4.5% Preferred Stock	22,044
Common Stock	100,000
Capital Surplus	58,236
Retained Earnings	262,799
	$623,772
Less: Treasury Stock	(477)
TOTAL LONG TERM CAPITAL	$623,295

The second step is to divide the preferred stock by the total long term capital.

$$\frac{\text{Preferred Stock}}{\text{Total Long Term Capital}} = \frac{22,044}{623,295} = .035 \text{ or } 3.5\%$$

[1]For the purposes of this example, preferred, debt, and equity share are calculated for one year only. In actual penalty calculations the preferred, debt, and equity share will be the average of the most recent five years.

[2]Deferred taxes are not included in the calculation of the debt, equity, and preferred share of the investment.

EXHIBIT II-7
(continued)

CALCULATION OF THE EQUITY, DEBT AND
PREFERRED SHARE OF THE INVESTMENT
FERTILIZER COMPANY
(000's)

The third step is to take the sum of the long-term debt accounts. Divide this by the total long-term capital.

4.5% Debentures	$ 21,531
9.75% Notes	60,000
Long-Term Lease	43,932
Pollution Control Revenue Bonds	46,000
Other Long-Term Debt	9,230
TOTAL DEBT	$180,693

$$\frac{\text{Total Long-Term Debt}}{\text{Total Long-Term Capital}} = \frac{180,693}{623,295} = .290 \text{ or } 29.0\%$$

The fourth step is to sum all common equity accounts. Do not include the preferred stock. Divide this number by the total long term capital.

Common Stock	$100,000
Capital Surplus	58,236
Retained Earnings	262,799
TOTAL	421,035
Less: Treasury Stock	(477)
TOTAL COMMON EQUITY	$420,588

$$\frac{\text{Total Common Equity}}{\text{Total Long-Term Capital}} = \frac{420,558}{623,295} = .675 \text{ or } 67.5\%$$

Thus, 3.5 percent is the preferred stock share of the investment, 29.0 percent is the debt share of the investment and 67.5 percent is the equity share of the investment for a total of 100.0 percent.

part of a year the number should be rounded up to the next integer. The useful life must always be greater than or equal to the depreciation life in years.

For the Fertilizer Company example, the "Asset Guideline Period" for chemicals and allied products is used. This is eleven years. Had it been 11.5 years, it would have been rounded up to twelve.

ATTACHMENT I
(continued)

UTILITY AFTER-TAX RETURN ON EQUITY
(PERCENT)

	ELECTRIC POWER AND GAS	TELEPHONE AND TELEGRAPH
1979	11.7	13.3
1978	11.3	13.5
1977	11.7	12.7
1976	11.5	11.5
1975	11.6	9.9

Source: Monthly Economic Letter, Citibank, New York, April 1980 and April issues of prior years.

II-27

ATTACHMENT I
QUARTERLY FINANCIAL REPORT FOR MANUFACTURING
MINING AND TRADE CORPORATIONS

TABLE 4. ANNUAL RATES OF PROFIT ON STOCKHOLDERS' EQUITY, BY INDUSTRY
(Percent)

Industry	Before income taxes 2/					After taxes				
	1Q 1978 3/	2Q 1978 3/	3Q 1978 3/	4Q 1978 3/	1Q 1979	1Q 1978 3/	2Q 1978 3/	3Q 1978 3/	4Q 1978 3/	1Q 1979
All Manufacturing Corporations	20.7	27.0	24.6	25.8	25.4	12.4	16.6	14.9	16.1	15.7
Nondurable Manufacturing Corporations	19.8	23.6	23.3	23.9	24.1	12.1	14.8	14.4	15.3	15.3
Food and Kindred Products	19.8	24.2	22.6	24.5	20.3	11.6	15.1	13.5	15.3	12.2
Tobacco Manufactures	28.9	33.7	33.1	30.8	30.7	16.5	19.0	18.7	18.1	18.5
Textile Mill Products	16.9	24.1	21.8	20.5	16.8	9.0	13.3	12.0	11.7	9.8
Paper and Allied Products	17.5	22.2	19.8	21.8	24.2	11.3	14.1	12.2	14.1	16.3
Printing and Publishing	26.3	34.7	33.6	36.1	27.6	14.4	19.8	18.3	21.1	16.0
Chemicals and Allied Products	23.5	26.4	24.5	24.0	27.5	14.3	16.7	15.2	16.3	17.6
Industrial chemicals and synthetics 1/	21.2	23.4	20.9	23.5	26.6	12.9	14.6	13.2	17.2	16.9
Drugs 1/	31.2	30.9	28.6	25.9	30.6	20.0	20.6	e18.9	17.0	20.7
Petroleum and Coal Products	16.3	19.5	21.1	22.3	23.7	11.0	13.2	14.1	14.9	15.8
Rubber and Miscellaneous Plastics Products	16.3	20.2	18.1	13.5	21.8	10.6	11.5	10.7	8.3	14.1
Other Nondurable Manufacturing Corporations	25.4	22.7	30.6	26.6	22.6	14.0	13.1	16.9	14.3	12.6
Durable Manufacturing Corporations	21.7	30.6	25.6	27.9	26.7	12.7	18.6	15.4	16.9	16.2
Stone, Clay and Glass Products	14.1	30.7	33.5	28.1	15.4	8.0	19.1	21.3	17.8	7.7
Primary Metal Industries	6.2	20.0	15.6	18.5	20.0	3.4	12.8	9.9	11.1	12.7
Iron and steel 1/	4.5	20.7	16.0	16.9	16.5	2.0	13.5	10.3	9.8	10.1
Nonferrous metals 1/	9.3	18.6	14.8	21.2	25.9	6.1	11.6	9.0	13.4	16.9
Fabricated Metal Products	22.3	32.6	28.3	25.8	26.9	12.7	19.6	16.4	15.4	15.8
Machinery, except Electrical	24.0	33.4	26.2	31.6	26.8	14.5	20.6	16.1	19.1	16.3
Electrical and Electronic Equipment	26.1	29.9	30.0	29.0	28.3	14.8	17.1	17.6	17.2	17.2
Transportation Equipment	26.9	32.7	21.4	28.2	32.3	15.9	19.6	12.8	17.8	20.1
Motor vehicles and equipment 1/	28.0	36.8	18.0	27.2	34.5	16.8	22.0	10.9	17.8	21.8
Aircraft, guided missiles and parts 1/	25.0	18.7	30.8	32.9	29.2	14.1	11.4	17.9	19.0	17.6
Instruments and Related Products	25.4	32.6	32.2	31.1	27.4	14.9	19.9	18.4	18.3	16.7
Other Durable Manufacturing Corporations	23.1	34.5	30.5	30.1	27.3	13.0	20.7	18.4	18.2	16.4
All Mining Corporations	15.3	25.3	19.4	25.0	19.2	9.0	17.6	12.0	18.5	12.3
All Retail Trade Corporations	17.2	30.9	31.3	32.9	NA	11.0	22.3	20.9	20.9	NA
All Wholesale Trade Corporations	22.3	30.6	29.8	27.1	29.7	13.6	20.5	18.4	16.9	18.9

1/ Included in major industry above.
2/ Based on profit figure which includes net income (loss) of foreign branches and equity in earnings (losses) of non-consolidated subsidiaries, net of foreign taxes.
3/ Some of the rates in this column have been revised since their first appearance. See footnotes to Tables A - E.

ATTACHMENT II
MOODY'S CORPORATE BOND YIELD AVERAGE

Moody's Corporate Bond Yield Averages

	Av. Corp.	Corporate by Ratings Aaa	Aa	A	Baa	Corporate by Groups P.U.	Ind.	R.R.
1973								
June	7.69	7.37	7.55	7.71	8.13	7.69	7.49	8.07
July	7.80	7.45	7.64	7.86	8.24	7.81	7.59	8.17
Aug.	8.04	7.68	7.84	8.11	8.53	8.06	7.91	8.32
Sept.	8.06	7.63	7.86	8.11	8.63	8.09	7.89	8.37
Oct.	7.96	7.60	7.84	7.98	8.49	8.04	7.76	8.24
Nov.	8.01	7.67	7.90	8.07	8.42	8.11	7.81	8.28
Dec.	8.05	7.68	7.92	8.11	8.48	8.17	7.84	8.29
1974								
Jan.	8.12	7.83	8.05	8.17	8.48	8.27	7.97	8.34
Feb.	8.17	7.85	8.05	8.25	8.53	8.33	8.01	8.27
Mar.	8.28	8.09	8.14	8.32	8.62	8.44	8.12	8.34
Apr.	8.54	8.25	8.43	8.61	8.87	8.68	8.39	8.31
May	8.71	8.37	8.58	8.83	9.05	8.85	8.55	8.73
June	8.89	8.47	8.75	9.07	9.23	9.08	8.69	8.89
July	9.15	8.72	9.01	9.40	9.46	9.24	8.95	9.07
Aug.	9.43	9.00	9.28	9.67	9.77	9.70	9.16	9.30
Sept.	9.78	9.24	9.66	10.04	10.18	10.11	9.44	9.46
Oct.	9.92	9.27	9.64	10.29	10.48	10.31	9.53	9.64
Nov.	9.70	8.99	9.34	9.96	10.40	10.12	9.29	9.38
Dec.	9.63	8.89	9.20	9.89	10.43	10.02	9.23	9.39
1975								
Jan.	9.65	8.83	9.13	9.81	10.81	10.10	9.19	9.32
Feb.	9.43	8.62	8.91	9.51	10.65	9.83	9.01	9.32
Mar.	9.36	8.67	8.92	9.37	10.48	9.67	9.05	9.25
Apr.	9.59	8.95	9.19	9.62	10.58	9.88	9.30	9.39
May	9.66	8.90	9.24	9.79	10.69	9.93	9.37	9.49
June	9.53	8.77	9.13	9.67	10.62	9.81	9.29	9.40
July	9.34	8.84	9.13	9.61	10.35	9.81	9.26	9.37
Aug.	9.61	8.95	9.23	9.68	10.59	9.93	9.29	9.41
Sept.	9.67	8.95	9.35	9.74	10.61	9.98	9.35	9.42
Oct.	9.63	8.86	9.32	9.72	10.62	9.94	9.32	9.40
Nov.	9.55	8.78	9.23	9.64	10.36	9.83	9.27	9.36
Dec.	9.57	8.79	9.21	9.67	10.36	9.87	9.26	9.37
1976								
Jan.	9.42	8.60	9.13	9.54	10.41	9.68	9.16	9.32
Feb.	9.31	8.55	9.02	9.43	10.24	9.50	9.12	9.25
Mar.	9.26	8.52	9.01	9.40	10.12	9.43	9.10	9.16
Apr.	9.12	8.40	8.89	9.26	9.94	9.27	8.98	9.05
May	9.16	8.38	8.92	9.28	9.86	9.31	9.00	8.96
June	9.16	8.42	8.89	9.24	9.89	9.36	8.96	8.88
July	9.08	8.36	8.81	9.16	9.82	9.26	8.90	8.81
Aug.	8.93	8.41	8.66	8.98	9.64	9.07	8.79	8.78
Sept.	8.79	8.38	8.54	8.81	9.40	8.91	8.66	8.66
Oct.	8.71	8.32	8.48	8.73	9.29	8.83	8.58	8.54
Nov.	8.66	8.25	8.46	8.69	9.23	8.77	8.54	8.48
Dec.	8.67	8.98	8.24	8.53	9.12	8.81	8.53	8.39
1977								
Jan.	8.41	7.96	8.16	8.43	9.08	8.59	8.24	8.29
Feb.	8.44	8.04	8.26	8.49	9.12	8.63	8.33	8.26
Mar.	8.51	8.10	8.28	8.55	9.12	8.66	8.36	8.26
Apr.	8.49	8.04	8.28	8.57	9.07	8.65	8.32	8.17
May	8.47	8.03	8.28	8.55	9.01	8.64	8.30	8.12
June	8.38	7.95	8.19	8.46	8.91	8.55	8.23	8.06
July	8.33	7.94	8.12	8.40	8.87	8.48	8.18	8.02
Aug.	8.34	7.98	8.17	8.40	8.82	8.47	8.21	8.03
Sept.	8.31	7.92	8.15	8.37	8.80	8.43	8.19	8.03
Oct.	8.42	8.04	8.26	8.48	8.89	8.56	8.27	8.07
Nov.	8.48	8.08	8.34	8.56	8.93	8.61	8.36	8.10
Dec.	8.54	8.19	8.40	8.57	8.99	8.62	8.42	8.10
1978								
Jan.	8.74	8.41	8.59	8.76	9.17	8.87	8.60	8.20
Feb.	8.78	8.47	8.65	8.79	9.20	8.90	8.65	8.32
Mar.	8.80	8.47	8.66	8.83	9.22	8.93	8.66	8.34
Apr.	8.88	8.56	8.73	8.93	9.32	9.05	8.72	8.49
May	9.02	8.69	8.84	9.05	9.49	9.19	8.84	8.60
June	9.13	8.76	8.95	9.18	9.60	9.33	8.92	8.68
July	9.22	8.88	9.07	9.33	9.60	9.38	9.05	8.70
Aug.	9.08	8.69	8.96	9.18	9.48	9.21	8.95	8.72
Sept.	9.04	8.69	8.92	9.11	9.42	9.17	8.90	8.68
Oct.	9.20	8.89	9.07	9.24	9.39	9.37	9.03	8.74
Nov.	9.40	9.03	9.24	9.44	9.83	9.58	9.21	9.01
Dec.	9.49	9.16	9.33	9.53	9.94	9.67	9.31	9.15
1979								
Jan	9.65	9.25	9.48	9.72	10.13	9.85	9.44	9.21
Feb	9.63	9.26	9.50	9.68	10.08	9.84	9.42	9.22
Mar.	9.76	9.37	9.61	9.81	10.26	10.03	9.50	9.30
Apr.	9.81	9.38	9.65	9.84	10.33	10.05	9.57	9.38
May	9.96	9.50	9.86	10.00	10.47	10.23	9.69	9.48
June	9.81	9.29	9.66	9.89	10.38	10.04	9.57	9.44
July	9.69	9.20	9.49	9.75	10.29	9.90	9.47	9.45

	Public Utility Bonds Aaa	Aa	A	Baa	Industrial Bonds Aaa	Aa	A	Baa	Railroad Bonds Aaa	Aa	A	Baa
June	7.51	7.59	7.71	7.94	7.23	7.26	7.46	7.99	---	7.79	7.97	8.47
July	7.62	7.70	7.82	8.10	7.28	7.36	7.64	8.10	---	7.87	8.12	8.51
Aug.	7.81	7.92	8.04	8.47	7.56	7.72	8.03	8.34	---	7.90	8.27	8.80
Sept.	7.78	7.94	8.06	8.61	7.44	7.73	7.99	8.35	---	7.91	8.29	8.93
Oct.	7.77	7.94	8.02	8.44	7.43	7.67	7.96	8.21	---	7.92	8.21	8.68
Nov.	7.83	8.01	8.15	8.44	7.50	7.67	7.98	8.17	---	8.02	8.17	8.66
Dec.	7.86	8.07	8.24	8.51	7.50	7.69	7.99	8.29	---	7.99	8.30	8.68
Jan.	8.00	8.15	8.36	8.58	7.65	7.85	7.98	8.38	---	7.92	8.32	8.77
Feb.	8.01	8.20	8.42	8.68	7.70	7.90	8.07	8.27	---	7.80	8.29	8.72
Mar.	8.14	8.35	8.46	8.81	7.87	8.00	8.19	8.42	---	7.90	8.38	8.73
Apr.	8.36	8.56	8.77	9.04	8.13	8.29	8.45	8.69	---	7.99	8.63	8.91
May	8.47	8.71	9.00	9.23	8.26	8.44	8.66	8.85	---	8.10	8.88	9.20
June	8.58	8.83	9.32	9.48	8.34	8.57	8.92	9.03	---	8.14	9.02	9.51
July	8.83	9.17	9.66	9.72	8.40	8.85	9.13	9.23	---	8.28	9.27	9.70
Aug.	9.09	9.53	10.03	10.14	8.89	9.03	9.31	9.39	---	8.62	9.58	9.77
Sept.	9.36	10.05	10.45	10.59	9.12	9.26	9.62	9.78	---	8.74	9.64	10.01
Oct.	9.50	9.93	10.78	11.03	9.03	9.35	9.80	9.92	---	8.92	9.71	10.19
Nov.	9.40	9.34	10.46	11.38	8.89	9.13	9.44	9.81	---	8.72	9.70	10.30
Dec.	9.02	9.37	10.27	11.40	8.74	9.03	9.31	9.85	---	8.69	9.67	10.40
Jan.	8.99	9.45	10.37	11.57	8.65	8.81	9.25	10.02	---	8.70	9.65	10.23
Feb.	8.79	9.23	9.99	11.32	8.44	8.60	9.03	9.98	---	8.39	9.40	9.98
Mar.	8.82	9.17	9.72	10.94	8.52	8.67	9.01	10.01	---	8.57	9.25	9.92
Apr.	8.98	9.38	10.06	10.86	8.75	8.96	9.22	10.30	---	8.70	9.61	9.87
May	9.05	9.30	10.23	10.95	8.75	8.96	9.34	10.42	---	8.67	9.81	10.00
June	8.93	9.34	10.10	10.85	8.61	8.91	9.23	10.39	---	8.58	9.68	9.97
July	9.04	9.38	10.01	10.80	8.62	8.88	9.33	10.30	---	8.34	9.67	9.98
Aug.	9.20	9.52	10.12	10.87	8.69	8.94	9.34	10.31	---	8.62	9.74	9.86
Sept.	9.21	9.64	10.19	10.89	8.68	9.06	9.28	10.35	---	8.61	9.75	9.91
Oct.	9.14	9.55	10.16	10.89	8.57	9.00	9.28	10.34	---	8.55	9.77	9.87
Nov.	9.03	9.45	10.04	10.78	8.52	9.00	9.24	10.33	---	8.46	9.72	9.88
Dec.	9.07	9.51	10.11	10.79	8.51	8.99	9.23	10.33	---	8.47	9.69	9.94
Jan.	8.86	9.39	9.90	10.55	8.33	8.87	9.18	10.26	---	8.45	9.62	9.90
Feb.	8.80	9.16	9.71	10.31	8.29	8.87	9.15	10.17	---	8.38	9.54	9.81
Mar.	8.74	9.12	9.67	10.17	8.30	8.88	9.12	10.07	---	8.38	9.47	9.74
Apr.	8.59	9.00	9.53	9.95	8.20	8.78	9.00	9.92	---	8.21	9.27	9.63
May	8.73	9.06	9.35	9.91	8.43	8.78	9.00	9.88	---	8.14	9.17	9.55
June	8.84	9.07	9.34	10.01	8.40	8.71	8.97	9.76	---	8.13	9.11	9.40
July	8.78	9.02	9.87	9.88	8.33	8.59	8.91	9.75	---	8.04	9.11	9.27
Aug.	8.64	8.83	9.13	9.67	8.26	8.48	8.82	9.61	---	7.99	9.06	9.19
Sept.	8.57	8.69	8.90	9.47	8.18	8.39	8.72	9.33	---	7.96	8.92	9.01
Oct.	8.50	8.60	8.79	9.41	8.14	8.36	8.66	9.17	---	7.82	8.85	8.96
Nov.	8.39	8.61	8.76	9.34	8.12	8.30	8.63	9.12	---	7.72	8.82	8.91
Dec.	8.15	8.45	8.62	9.21	7.81	8.04	8.43	9.03	---	7.67	8.69	8.81
Jan.	8.14	8.41	8.61	9.17	7.77	7.90	8.28	8.99	---	7.52	8.54	8.76
Feb.	8.21	8.46	8.65	9.19	7.86	8.06	8.33	9.04	---	7.59	8.52	8.67
Mar.	8.27	8.49	8.70	9.20	7.92	8.07	8.40	9.04	---	7.70	8.48	8.59
Apr.	8.21	8.51	8.71	9.17	7.86	8.05	8.39	8.97	---	7.63	8.37	8.53
May	8.22	8.49	8.71	9.13	7.87	8.06	8.39	8.88	---	7.61	8.21	8.54
June	8.12	8.37	8.58	9.02	7.77	8.00	8.33	8.80	---	7.55	8.08	8.35
July	8.10	8.32	8.51	8.97	7.78	7.92	8.28	8.75	---	7.53	7.89	8.65
Aug.	8.13	8.36	8.49	8.91	7.82	7.97	8.30	8.72	---	7.56	7.89	8.71
Sept.	8.07	8.32	8.46	8.85	7.76	7.97	8.27	8.74	---	7.62	7.83	8.68
Oct.	8.18	8.34	8.61	9.01	7.88	8.08	8.35	8.77	---	7.74	7.87	8.39
Nov.	8.23	8.48	8.64	9.06	7.93	8.20	8.46	8.84	---	7.79	7.91	8.81
Dec.	8.34	8.55	8.64	9.08	8.04	8.23	8.49	8.90	---	7.83	7.93	8.95
Jan.	8.52	8.76	8.92	9.27	8.31	8.42	8.60	9.07	---	7.93	8.04	8.83
Feb.	8.57	8.79	8.97	9.29	8.37	8.50	8.62	9.11	---	8.09	8.18	8.71
Mar.	8.57	8.79	8.98	9.37	8.36	8.53	8.69	9.07	---	8.10	8.30	8.88
Apr.	8.69	8.86	9.09	9.54	8.43	8.59	8.76	9.10	---	8.08	8.43	8.93
May	8.83	9.02	9.22	9.70	8.54	8.68	8.87	9.27	---	8.14	8.67	9.01
June	8.92	9.19	9.40	9.78	8.60	8.71	8.96	9.40	---	8.08	8.89	9.07
July	8.83	9.26	9.51	9.73	8.73	8.87	9.14	9.46	---	7.92	9.05	9.13
Aug.	8.86	9.11	9.32	9.53	8.52	8.80	9.04	9.43	---	7.85	9.04	9.28
Sept.	8.84	9.09	9.28	9.47	8.54	8.75	8.94	9.36	---	7.83	8.94	9.27
Oct.	9.08	9.28	9.46	9.69	8.72	8.87	9.06	9.49	---	7.94	8.99	9.30
Nov.	9.19	9.46	9.68	9.99	8.87	9.02	9.27	9.66	---	8.30	9.23	9.70
Dec.	9.34	9.56	9.70	10.08	8.98	9.10	9.35	9.79	---	8.32	9.38	9.75
Jan	9.48	9.70	9.90	10.29	9.01	9.24	9.54	9.96	---	8.33	9.53	9.78
Feb.	9.51	9.74	9.84	10.27	9.01	9.25	9.51	9.84	---	8.32	9.52	9.81
Mar.	9.61	9.89	10.04	10.53	9.11	9.33	9.59	9.98	---	8.46	9.62	9.84
Apr.	9.61	9.92	10.10	10.56	9.15	9.37	9.65	10.11	---	8.50	9.67	9.98
May	9.71	10.19	10.30	10.70	9.30	9.52	9.70	10.24	---	8.69	9.85	10.08
June	9.49	9.95	10.14	10.56	9.08	9.36	9.64	10.19	---	8.64	9.64	10.04
July	9.42	9.72	9.98	10.48	8.98	9.26	9.52	10.11	---	8.76	9.55	10.03

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ATTACHMENT III
MOODY'S PUBLIC UTILITY PREFERRED STOCK YIELD AVERAGE

MOODY'S PREFERRED STOCK RATINGS A1a-App 75

Moody's Preferred Stock Ratings

Moody's Rating Policy Review Board Extended its rating services to include quality designations on preferred stocks on October 1, 1973. The decision to rate preferred stocks, which Moody's had done prior to 1935, was prompted by evidence of investor interest. Moody's believes that its rating of preferred stocks is especially appropriate in view of the ever-increasing amount of these securities outstanding, and the fact that continuing inflation and its ramifications have resulted generally in the dilution of some of the protection afforded them as well as other fixed-income securities.

Because of the fundamental differences between preferred stocks and bonds, a variation of our familiar bond rating symbols is being used in the quality ranking of preferred stocks. The symbols, presented below, are designed to avoid comparison with bond quality in absolute terms. It should always be borne in mind that preferred stocks occupy a junior position to bonds within a particular capital structure.

Preferred stock rating symbols and their definitions are as follows:

"aaa"

An issue which is rated "aaa" is considered to be a top-quality preferred stock. This rating indicates good asset protection and the least risk of dividend impairment within the universe of preferred stocks.

"aa"

An issue which is rated "aa" is considered a high-grade preferred stock. This rating indicates that there is reasonable assurance that earnings and asset protection will remain relatively well maintained in the foreseeable future.

"a"

An issue which is rated "a" is considered to be an upper-medium grade preferred stock. While risks are judged to be somewhat greater than in the "aaa" and "aa" classifications, earnings and asset protection are, nevertheless, expected to be maintained at adequate levels.

"baa"

An issue which is rated "baa" is considered to be medium grade, neither highly protected nor poorly secured. Earnings and asset protection appear adequate at present but may be questionable over any great length of time.

"ba"

An issue which is rated "ba" is considered to have speculative elementsand its future cannot be considered well assured. Earnings and asset protection may be very moderate and not well safeguarded during adverse periods. Uncertainty of position characterizes preferred stocks in this class.

"b"

An issue which is rated "b" generally lacks the characteristics of a desirable investment. Assurance of dividend payments and maintenance of other terms of the issue over any long period of time may be small.

"caa"

An issue which is rated "caa" is likely to be in arrears on dividend payments. This rating designation does not purport to indicate the future status of payments.

Moody's Public Utility Preferred Stock Yield Averages

"aa"

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1973	—	—	—	—	—	—	9.38	9.55	9.64	9.42	9.31	9.33
1976	8.79	8.74	8.92	8.77	8.90	8.91	8.80	8.72	8.58	8.49	8.37	8.28
1977	8.36	8.23	8.31	8.16	8.14	8.03	7.91	8.02	7.95	8.08	8.15	8.14
1978	8.31	8.38	8.35	8.31	8.61	8.84	8.80	8.86	8.82	8.61	8.72	8.94
1979	9.05	9.11	9.10	9.15	9.19	9.03	8.98	—	—	—	—	—

"a"

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1973	—	—	—	—	—	—	10.39	10.46	10.52	10.27	10.22	10.23
1976	9.43	9.42	9.52	9.26	9.46	9.46	9.37	9.31	9.04	8.93	8.99	8.80
1977	8.83	8.80	8.75	8.61	8.64	8.47	8.21	8.30	8.32	8.50	8.55	8.59
1978	8.70	8.74	8.79	8.88	9.07	9.39	9.33	8.97	8.82	9.07	9.27	9.65
1979	9.61	9.66	9.63	9.71	9.91	9.53	9.60	—	—	—	—	—

"baa"

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1973	—	—	—	—	—	—	10.70	10.98	11.11	10.81	10.93	10.67
1976	9.78	9.87	9.73	9.62	9.76	9.79	9.74	9.67	9.45	9.30	9.30	9.13
1977	9.01	8.98	9.01	9.00	9.04	8.92	8.65	8.72	8.87	8.98	8.96	9.03
1978	9.17	9.17	9.34	9.34	9.38	9.61	9.76	9.34	9.62	9.66	9.89	10.48
1979	10.43	10.37	10.33	10.43	10.82	10.49	10.33	—	—	—	—	—

NOTE: There is no "aaa" average because of the dearth of prime-quality preferred stocks. Yields are based on prices for the last Friday of each month.

ATTACHMENT IV

This attachment is IRS Revenue Procedure 77-10.

26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability. (Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 77-10

SECTION 1. PURPOSE.

.01 The purpose of this Revenue Procedure is to restate, pursuant to sections 167(m) and 263(e) of the Internal Revenue Code of 1954, with certain substantive modifications as noted below, the asset guideline classes, asset guideline depreciation periods and ranges, and annual asset guideline repair allowance percentages for the Class Life Asset Depreciation Range (CLADR) System.

.02 This Revenue Procedure supersedes Rev. Proc. 72-10, 1972-1 C.B. 721, and the supplements and revisions of the asset guideline classes, periods, and repair allowance percentages published since the publication of Rev. Proc. 72-10. These Revenue Procedures are as follows:

73-2, 1973-1 C.B. 747
73-3, 1973-1 C.B. 749
73-23, 1973-2 C.B. 474
73-24, 1973-2 C.B. 475
73-25, 1973-2 C.B. 477
73-26, 1973-2 C.B. 479
73-27, 1973-2 C.B. 480
73-28, 1973-2 C.B. 482
73-30, 1973-2 C.B. 484
74-27, 1974-2 C.B. 480
74-28, 1974-2 C.B. 481
74-29, 1974-2 C.B. 482
74-30, 1974-2 C.B. 483
74-31, 1974-2 C.B. 487
74-32, 1974-2 C.B. 487
74-37, 1974-2 C.B. 491
74-50, 1974-2 C.B. 506
76-16, 1976-1 C.B. 556
76-17, 1976-1 C.B. 557
76-18, 1976-1 C.B. 559
76-27, 1976-2 C.B. 644
76-37, 1976-2 C.B. 659
77-2, page 534
77-3, page 535
77-8, page 541

.03 In addition, certain changes are made in the numbering system of asset guideline classes to facilitate the understanding and use of the CLADR system.

Broad title headings and asset guideline class number designations for several related guideline classes have been deleted wherever feasible to eliminate confusion over the appropriate asset guideline class number designations.

The asset guideline classes for "Office Furniture, Fixtures, and Equipment," "Information System," and "Data Handling Equipment, except Computers," were established in Rev. Proc. 73-2 as asset guideline classes 70.11, 70.12, and 70.13, respectively. These classes have been redesignated asset guideline classes 00.11, 00.12, and 00.13, respectively. In addition, the asset guideline class for Industrial Steam and Electric Generation and Distribution Systems, designated asset guideline class 49.5, has been redesignated asset guideline class 00.4. The redesignations group these asset guideline classes with certain other asset guideline classes by types of depreciable assets rather than by the activity or the product of an activity.

.04 Numerous changes and modifications have been made to the language of the asset guideline class descriptions. These changes are not intended to modify the composition of the existing classes of Rev. Proc. 72-10.

.05 The following substantive modifications of the classes of Rev. Proc. 72-10 have been made:

(i) Assets used in the ginning of cotton have been reclassified from class 39.0 to class 01.1.

(ii) Assets used by plumbing contractors have been reclassified from class 70.2 to class 15.1.

(iii) The description of assets included in class 15.2, "Marine Contract Construction," has been modified to be consistent with Rev. Proc. 66-18, 1966-1 C.B. 646.

(iv) Subclass 49.121, "Electric Utility Nuclear Fuel Assemblies," is part of class 49.12, "Electric Utility Nuclear Production Plant," to which it is related. Assets included in subclass 49.121 are not separately subject to possible exclusion from an election to apply section 1.167(a)-11(b)(5)(v) of the regulations. See Section 2.02(i) of this Revenue Procedure.

SEC. 2. RULE OF APPLICATION

.01 The asset guideline classes, asset guideline periods and ranges, and annual asset guideline repair allowances percentages set forth are for use under the rules set forth in section 1.167(a)-11 of the Income Tax Regulations.

.02 It should be noted that the following special rules apply as specified:

(i) It is expressly provided that asset guideline classes and subclasses 00.4, 20.5, 30.11, 30.21, 32.11, 33.11, 33.21, 34.01, 35.11, 35.21, 36.11, 37.12, 37.32, 37.33, and 49.121 are part of existing activity classes to which the assets included in them relate as stated in the Revenue Procedures establishing these subclasses; therefore, assets included in these classes and subclasses are not separately subject to possible exclusion from an election to apply section 1.167(a)-11(b)(5)(v) of the regulations.

(ii) "Service assets," as defined in classes 50.1 and 70.21, the cost of which is properly deductible under section 162 of the Code, are not eligible property under the CLADR system. Further, service assets may be treated as mass assets as defined in section 1.47-1(e)(4) of the regulations. Service assets may be depreciated under a method not described in section 167(b)(1), (2), or (3), if the requirements of section 1.167(a)-11(b)(5)(v) are met.

(iii) If the asset guideline class repair allowance for class 32.1 is elected in accordance with section 1.167(a)-11(d)(2)(ii) of the regulations, "cold tank repairs," including refractory relining expenditures to glass furnaces, shall be treated as deductible repairs within the provisions and limitations of section 1.167(a)-11(d)(2)(iv)(a) dealing with the application of the asset guideline class repair allowance.

(iv) General rebuilding or rehabilitation costs for the special tools defined in class 30.11 that have been traditionally capitalized as the cost of a new asset are included in class 30.11.

(v) Asset guideline class 00.3, "Land Improvements," includes "other tangible property" that qualifies under section 1.48-1(d) of the regulations. However, a structure that is essentially an item of machinery or equipment or a structure that houses property used as an integral part of an activity specified in section 48(a)(1)(B)(i) of the Code, if the use of the structure is so closely related to the use of the property that the structure clearly can be expected to be replaced when the property it initially houses is replaced, is included in the asset guideline class appropriate to the equipment to which it is related.

.03 Property that is used predominantly outside the United States may be eligible property if the requirements of section 1.167(a)-11(b)(2) of the regulations are met. In the case of property first placed in service and used predominantly outside the United States during the taxable year of election, an asset guideline period, but no asset depreciation range is in effect. Accordingly, such property shall not be treated as included in the same asset guideline class as property used predominantly inside the United States, for purposes of determining the asset depreciation period under section 1.167(a)-11(b)(4). Thus, for this purpose each asset guideline class described in this Revenue Procedure has an exact counterpart that consists of property otherwise includable within the class, but used predominantly outside the United States during the taxable year of election. Generally, for this purpose property is used predominantly outside the United States if such property is physically located outside the United States during more than 50 percent of days of the taxable year of election, beginning with the date the property is first placed in service. However, there are ten exceptions to this general rule and these are contained in section 48(a)(2) of the Code. The asset depreciation period for property, which is determined in the taxable year of election, will not be changed because of a change in predominant use after the close of such taxable year. Although treated as in a separate class for purposes of determining the asset depreciation period, property predominantly used outside the United States shall be included in the same asset guideline class as property predominantly used inside the United States for purposes of applying the asset guideline class repair allowance under section 1.167(a)-11(d)(2).

SEC. 3. ASSET GUIDELINE CLASSES AND PERIODS, ASSET DEPRECIATION RANGES, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGES.

The asset guideline classes, asset guideline periods, asset depreciation ranges, and annual asset guideline repair allowance percentages are prescribed as set forth below:

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
SPECIFIC DEPRECIABLE ASSETS USED IN ALL BUSINESS ACTIVITIES, EXCEPT AS NOTED:					
00.11	**Office Furniture, Fixtures, and Equipment:** Includes furniture and fixtures which are not a structural component of a building. Includes such assets as desks, files, safes, and communications equipment. Does not include communications equipment that is included in other CLADR classes	8	10	12	2
00.12	**Information Systems:** Includes computers and their peripheral equipment used in administering normal business transactions and the maintenance of business records, their retrieval and analysis. Information systems are defined as: 1) Computers: A computer is an electronically activated device capable of accepting information, applying prescribed processes to the information, and supplying the results of these processes with or without human intervention. It usually consists of a central processing unit containing extensive storage, logic, arithmetic, and control capabilities. Excluded from this category are adding machines, electronic desk calculators, etc. 2) Peripheral equipment consists of the auxiliary machines which may be placed under control of the central processing unit. Non limiting examples are: Card readers, card punches, magnetic tape feeds, high speed printers, optical character readers, tape cassettes, mass storage units, paper tape equipment, keypunches, data entry devices, teleprinters, terminals, tape drives, disc drives, disc files, disc packs, visual image projector tubes, card sorters, plotters, and collators. Peripheral equipment may be used on-line or off-line. Does not include equipment that is an integral part of other capital equipment and which is included in other CLADR classes of economic activity, i.e., computers used primarily for process or production control, switching and channeling	5	6	7	7.5
00.13	**Data Handling Equipment, except Computers:** Includes only typewriters, calculators, adding and accounting machines, copiers, and duplicating equipment	5	6	7	15
00.21	**Airplanes (airframes and engines),** except those used in commercial or contract carrying of passengers or freight, and all helicopters (airframes and engines)	5	6	7	14
00.22	**Automobiles, Taxis**	2.5	3	3.5	16.5
00.23	**Buses**	7	9	11	11.5
00.241	**Light General Purpose Trucks:** Includes trucks for use over the road (actual unloaded weight less than 13,000 pounds)	3	4	5	16.5
00.242	**Heavy General Purpose Trucks:** Includes heavy general purpose trucks, concrete ready-mix truckers, and ore trucks, for use over the road (actual unloaded weight 13,000 pounds or more)	5	6	7	10

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
00.25	**Railroad Cars and Locomotives,** except those owned by railroad transportation companies	12	15	18	8
00.26	**Tractor Units For Use Over-The-Road**	3	4	5	16.5
00.27	**Trailers and Trailer-Mounted Containers**	5	6	7	10
00.28	**Vessels, Barges, Tugs, and Similar Water Transportation Equipment,** except those used in marine contract construction	14.5	18	21.5	6
00.3	**Land Improvements:** Includes improvements directly to or added to land, whether such improvements are section 1245 property or section 1250 property, provided such improvements are depreciable. Examples of such assets might include sidewalks, roads, canals, waterways, drainage facilities, sewers, wharves and docks, bridges, fences, landscaping, shrubbery, or radio and television transmitting towers. Does not include land improvements that are explicitly included in any other class, and buildings and structural components as defined in section 1.48-1(e) of the regulations. Excludes public utility initial clearing and grading land improvements as specified in Rev. Rul. 72-403, 1972-2 C.B. 102.		20		
00.4	**Industrial Steam and Electric Generation and/or Distribution Systems:** Includes assets, whether such assets are section 1245 property or 1250 property, providing such assets are depreciable, used in the production and/or distribution of electricity with rated total capacity in excess of 500 Kilowatts and/or assets used in the production and/or distribution of steam with rated total capacity in excess of 12,500 pounds per hour, for use by the taxpayer in his industrial manufacturing process or plant activity and not ordinarily available for sale to others. Does not include buildings and structural components as defined in section 1.48-1(e) of the regulations. Assets used to generate and/or distribute electricity or steam of the type described above of lesser rated capacity are not included, but are included in the appropriate manufacturing equipment classes elsewhere specified. Steam and chemical recovery boiler systems used for the recovery and regeneration of chemicals used in manufacturing, with rated capacity in excess of that described above, with specifically related distribution and return systems are not included but are included in appropriate manufacturing equipment classes elsewhere specified. An example of an excluded steam and recovery boiler system is that used in the pulp and paper manufacturing industry	22.5	28	33.5	2.5
	DEPRECIABLE ASSETS USED IN THE FOLLOWING ACTIVITIES:				
01.1	**Agriculture:** Includes machinery and equipment, grain bins, and fences but no other land improvements, that are used in the production of crops or plants, vines, and trees; livestock; the operation of farm dairies, nurseries, greenhouses, sod farms, mushroom cellars, cranberry bogs, apiaries, and fur farms; the performance of agricultural, animal husbandry, and horticultural services	8	10	12	11
01.11	**Cotton Ginning Assets**	9.5	12	14.5	5.5

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
01.21	**Cattle, Breeding or Dairy**	5.5	7	8.5	
01.22	**Horses, Breeding or Work**	8	10	12	
01.23	**Hogs, Breeding**	2.5	3	3.5	
01.24	**Sheep and Goats, Breeding**	4	5	6	
01.3	**Farm Buildings**	20	25	30	5
10.0	**Mining:** Includes assets used in the mining and quarrying of metallic and nonmetallic minerals (including sand, gravel, stone, and clay) and the milling, beneficiation and other primary preparation of such materials	8	10	12	6.5
13.1	**Drilling of Oil and Gas Wells:** Includes assets used in the drilling of onshore oil and gas wells and the provisions of geophysical and other exploration services; and the provision of such oil and gas field services as chemical treatment, plugging and abandoning of wells and cementing or perforating well casings. Does not include assets used in the performance of any of these activities and services by integrated petroleum and natural gas producers for their own account	5	6	7	10
13.2	**Exploration for and Production of Petroleum and Natural Gas Deposits:** Includes assets used by petroleum and natural gas producers for drilling of wells and production of petroleum and natural gas, including gathering pipelines and related storage facilities	11	14	17	4.5
13.3	**Petroleum Refining:** Includes assets used for the distillation, fractionation, and catalytic cracking of crude petroleum into gasoline and its other components	13	16	19	7
13.4	**Marketing of Petroleum and Petroleum Products:** Includes assets used in marketing petroleum and petroleum products, such as related storage facilities and complete service stations, but not including any of these facilities related to petroleum and natural gas trunk pipelines	13	16	19	4
15.1	**Contract Construction Other than Marine:** Includes assets used by general building, special trade, and heavy construction contractors. Does not include assets used by companies in performing construction services for their own account	4	5	6	12.5
15.2	**Marine Contract Construction:** Includes assets used by general building, special trade, and heavy construction contractors predominantly in marine construction work. Does not include assets used by companies in performing marine construction services for their own account except for floating, self-propelled, and other drilling platforms and support vessels used in offshore drilling for oil and gas which are included whether used for their own account or others	9.5	12	14.5	5
20.1	**Manufacture of Grain and Grain Mill Products:** Includes assets used in the production of flours, cereals, livestock feeds, and other grain and grain mill products	13.5	17	20.5	6

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
20.2	**Manufacture of Sugar and Sugar Products:** Includes assets used in the production of raw sugar, syrup, or finished sugar from sugar cane or sugar beets	14.5	18	21.5	4.5
20.3	**Manufacture of Vegetable Oils and Vegetable Oil Products:** Includes assets used in the production of oil from vegetable materials and the manufacture of related vegetable oil products	14.5	18	21.5	3.5
20.4	**Manufacture of Other Food and Kindred Products:** Includes assets used in the production of foods and beverages not included in classes 20.1, 20.2 and 20.3	9.5	12	14.5	5.5
20.5	**Manufacture of Food and Beverages-Special Handling Devices:** Includes assets defined as specialized materials handling devices such as returnable pallets, palletized containers, and fish processing equipment including boxes, baskets, carts, and flaking trays used in activities as defined in classes 20.1, 20.2, 20.3, 20.4. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	3	4	5	20
21.0	**Manufacture of Tobacco and Tobacco Products:** Includes assets used in the production of cigarettes, cigars, smoking and chewing tobacco, snuff, and other tobacco products	12	15	18	5
22.1	**Manufacture of Knitted Goods:** Includes assets used in the production of knitted and netted fabrics and lace. Assets used in yarn preparation, bleaching, dyeing, printing, and other similar finishing processes, texturing, and packaging, are elsewhere classified	6	7.5	9	7
22.2	**Manufacture of Yarn, Thread, and Woven Fabric:** Includes assets used in the production of spun yarns including the preparing, blending, spinning, and twisting of fibers into yarns and threads, the preparation of yarns such as twisting, warping, and winding, the production of covered elastic yarn and thread, cordage, woven fabric, tire fabric, braided fabric, twisted jute for packing, mattresses, pads, sheets, and industrial belts, and the processing of textile mill waste to recover fibers, flocks, and shoddies. Assets used to manufacture carpets, man-made fibers, and nonwovens, and assets used in texturing, bleaching, dyeing, printing, and other similar finishing processes, are elsewhere classified	9	11	13	16
22.3	**Manufacture of Carpets, and Dyeing, Finishing, and Packaging of Textile Products:** Includes assets used in the production of carpets, rugs, mats, woven carpet backing, chenille, and other tufted products, and assets used in the joining together of backing with carpet yarn or fabric. Includes assets used in washing, scouring, bleaching, dyeing, printing, drying, and similar finishing processes applied to textile fabrics, yarns, threads, and other textile goods. Includes assets used in the production and packaging of textile products, other than apparel, by creasing, forming, trimming, cutting, and sewing, such as the preparation of carpet and fabric samples, or similar joining together processes (other than the				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	production of scrim reinforced paper products and laminated paper products) such as the sewing and folding of hosiery and panty hose, the creasing, folding, trimming, and cutting of fabrics to produce nonwoven products, such as disposable diapers and sanitary products. Assets used in the manufacture of nonwoven carpet backing, and hard surface floor covering such as tile, rubber, and cork, are elsewhere classified	7	9	11	15
22.4	**Manufacture of Textured Yarns:** Includes assets used in the processing of yarns to impart bulk and/or stretch properties to the yarn. The principal machines involved are falsetwist, draw, beam-to-beam, and stuffer box texturing equipment and related high-speed twisters and winders. Assets, as described above, which are used to further process man-made fibers are elsewhere classified when located in the same plant in an integrated operation with man-made fiber producing assets. Assets used to manufacture man-made fibers and assets used in bleaching, dyeing, printing, and other similar finishing processes, are elsewhere classified	6.5	8	9.5	7
22.5	**Manufacture of Nonwoven Fabrics:** Includes assets used in the production of nonwoven fabrics, felt goods including felt hats, padding, batting, wadding, oakum, and fillings, from new materials and from textile mill waste. Nonwoven fabrics are defined as fabrics (other than reinforced and laminated composites consisting of nonwovens and other products) manufactured by bonding natural and/or synthetic fibers and/or filaments by means of induced mechanical interlocking, fluid entanglement, chemical adhesion, thermal or solvent reaction, or by combination thereof other than natural hydration bonding as occurs with natural cellulose fibers. Such means include resin bonding, web bonding, and melt bonding. Specifically includes assets used to make flocked and needle punched products other than carpets and rugs. Assets, as described above, which are used to manufacture nonwovens are elsewhere classified when located in the same plant in an integrated operation with man-made fiber producing assets. Assets used to manufacture man-made fibers and assets used in bleaching, dyeing, printing, and other similar finishing processes, are elsewhere classified	8	10	12	15
23.0	**Manufacture of Apparel and Other Finished Products:** Includes assets used in the production of clothing and fabricated textile products by the cutting and sewing of woven fabrics, other textile products, and furs; but does not include assets used in the manufacture of apparel from rubber and leather	7	9	11	7
24.1	**Cutting of Timber:** Includes logging machinery and equipment and roadbuilding equipment used by logging and sawmill operators and pulp manufacturers for their own account	5	6	7	10
24.2	**Sawing of Dimensional Stock from Logs:** Includes machinery and equipment installed in permanent or well-established sawmills	8	10	12	6.5

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
24.3	**Sawing of Dimensional Stock from Logs:** Includes machinery and equipment installed in sawmills characterized by temporary foundations and a lack, or minimum amount, of lumber-handling, drying, and residue disposal equipment and facilities	5	6	7	10
24.4	**Manufacture of Wood Products, and Furniture:** Includes assets used in the production of plywood, hardboard, flooring, veneers, furniture, and other wood products, including the treatment of poles and timber	8	10	12	6.5
26.1	**Manufacture of Pulp and Paper:** Includes assets for pulp materials handling and storage, pulp mill processing, bleach processing, paper and paperboard manufacturing, and on-line finishing. Includes pollution control assets and all land improvements associated with the factory site or production process such as effluent ponds and canals, provided such improvements are depreciable but does not include buildings and structural components as defined in section 1.48-1(e)(1) of the regulations. Includes steam and chemical recovery boiler systems, with any rated capacity, used for the recovery and regeneration of chemicals used in manufacturing. Does not include assets used either in pulpwood logging, or in the manufacture of hardboard	10.5	13	15.5	10
26.2	**Manufacture of Converted Paper, Paperboard, and Pulp Products:** Includes assets used for modification, or remanufacture of paper and pulp into converted products, such as paper coated off the paper machine, paper bags, paper boxes, cartons and envelopes. Does not include assets used for manufacture of non-wovens that are elsewhere classified	8	10	12	15
27.0	**Printing, Publishing, and Allied Industries:** Includes assets used in printing by one or more processes, such as letterpress, lithography, gravure, or screen; the performance of services for the printing trade, such as book-binding, typesetting, engraving, photoengraving, and electrotyping; and the publication of newspapers, books, and periodicals	9	11	13	5.5
28.0	**Manufacture of Chemicals and Allied Products:** Includes assets used in the manufacture of basic chemicals such as acids, alkalies, salts, and organic and inorganic chemicals; chemical products to be used in further manufacture, such as synthetic fibers and plastics materials, including petrochemical processing beyond that which is ordinarily a part of petroleum refining; and finished chemical products, such as pharmaceuticals, cosmetics, soaps, fertilizers, paints and varnishes, explosives, and compressed and liquified gases. Does not include assets used in the manufacture of finished rubber and plastic products or in the production of natural gas products, butane, propane, and byproducts of natural gas production plants	9	11	13	5.5
30.1	**Manufacture of Rubber Products:** Includes assets used for the production of products from natural, synthetic, or reclaimed rubber, gutta percha, balata, or gutta siak, such as tires, tubes, rubber footwear, mechanical rubber goods, heels and soles,				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	flooring, and rubber sundries; and in the recapping, retreading, and rebuilding of tires	11	14	17	5
30.11	**Manufacture of Rubber Products—Special Tools and Devices:** Includes assets defined as special tools, such as jigs, dies, mandrels, molds, lasts, patterns, specialty containers, pallets, shells, and tire molds, and accessory parts such as rings and insert plates used in activities as defined in class 30.1. Does not include tire building drums and accessory parts and general purpose small tools such as wrenches and drills, both power and hand-driven, and other general purpose equipment such as conveyors and transfer equipment	3	4	5	
30.2	**Manufacture of Finished Plastic Products:** Includes assets used in the manufacture of plastics products and the molding of primary plastics for the trade. Does not include assets used in the manufacture of basic plastics materials nor the manufacture of phonograph records	9	11	13	5.5
30.21	**Manufacture of Finished Plastic Products—Special Tools:** Includes assets defined as special tools, such as jigs, dies, fixtures, molds, patterns, gauges, and specialty transfer and shipping devices, used in activities as defined in class 30.2. Special tools are specifically designed for the production or processing of particular parts and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools, such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	3	3.5	4	5.5
31.0	**Manufacture of Leather and Leather Products:** Includes assets used in the tanning, currying, and finishing of hides and skins; the processing of fur pelts; and the manufacture of finished leather products, such as footwear, belting, apparel, and luggage	9	11	13	5.5
32.1	**Manufacture of Glass Products:** Includes assets used in the production of flat, blown, or pressed products of glass, such as float and window glass, glass containers, glassware and fiberglass. Does not include assets used in the manufacture of lenses	11	14	17	12
32.11	**Manufacture of Glass Products—Special Tools:** Includes assets defined as special tools such as molds, patterns, pallets, and specialty transfer and shipping devices such as steel racks to transport automotive glass, used in activities as defined in class 32.1. Special tools are specifically designed for the production or processing of particular parts and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	2	2.5	3	10

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
32.2	**Manufacture of Cement:** Includes assets used in the production of cement, but does not include any assets used in the manufacture of concrete and concrete products nor in any mining or extraction process	16	20	24	3
32.3	**Manufacture of Other Stone and Clay Products:** Includes assets used in the manufacture of products from materials in the form of clay and stone, such as brick, tile, and pipe; pottery and related products, such as vitreous-china, plumbing fixtures, earthenware and ceramic insulating materials; and also includes assets used in manufacture of concrete and concrete products. Does not include assets used in any mining or extraction processes	12	15	18	4.5
33.1	**Manufacture of Primary Ferrous Metals:** Includes assets used in the smelting and refining of ferrous metals from ore, pig, or scrap, the rolling, drawing, and alloying of ferrous metals; the manufacture of castings, forgings, and other basic products of ferrous metals; and the manufacture of nails, spikes, structural shapes, tubing, wire, and cable	14.5	18	21.5	8
33.11	**Manufacture of Primary Ferrous Metals—Special Tools:** Includes assets defined as special tools such as dies, jigs, molds, patterns, fixtures, gauges, and drawings concerning such special tools used in the activities as defined in class 33.1, manufacture of Primary Ferrous Metals. Special tools are specifically designed for the production or processing of particular products or parts and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices. Rolls, mandrels, and refractories are not included in class 33.11 but are included in class 33.1	5	6.5	8	4
33.2	**Manufacture of Primary Nonferrous Metals:** Includes assets used in the smelting, refining, and electrolysis of nonferrous metals from ore, pig, or scrap, the rolling, drawing, and alloying of nonferrous metals; the manufacture of castings, forgings, and other basic products of nonferrous metals; and the manufacture of nails, spikes, structural shapes, tubing, wire, and cable	11	14	17	4.5
33.21	**Manufacture of Primary Nonferrous Metals—Special Tools:** Includes assets defined as special tools such as dies, jigs, molds, patterns, fixtures, gauges, and drawings concerning such special tools used in the activities as defined in class 33.2, Manufacture of Primary Nonferrous Metals. Special tools are specifically designed for the production or processing of particular products or parts and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven,				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices. Rolls, mandrels, and refractories are not included in class 33.21 but are included in class 33.2	5	6.5	8	4
34.0	**Manufacture of Fabricated Metal Products:** Includes assets used in the production of metal cans, tinware, nonelectric heating apparatus, fabricated structural metal products, metal stampings, and other ferrous and nonferrous metal and wire products not elsewhere classified	9.5	12	14.5	6
34.01	**Manufacture of Fabricated Metal Products—Special Tools:** Includes assets defined as special tools such as dies, jigs, molds, patterns, fixtures, gauges, and returnable containers and drawings concerning such special tools used in the activities as defined in class 34.0. Special tools are specifically designed for the production or processing of particular machine components, products, or parts, and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	2.5	3	3.5	3.5
35.1	**Manufacture of Metalworking Machinery:** Includes assets used in the production of metal cutting and forming machines, special dies, tools, jigs, and fixtures, and machine tool accessories	9.5	12	14.5	5.5
35.11	**Manufacture of Metalworking Machinery—Special Tools:** Includes assets defined as special tools, such as jigs, dies, fixtures, molds, patterns, gauges, and specialty transfer and shipping devices, used in activities as defined in class 35.1. Special tools are specifically designed for the production or processing of particular machine components and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	5	6	7	12.5
35.2	**Manufacture of Other Machines:** Includes assets used in the production of such machinery as engines and turbines; farm machinery, construction, and mining machinery; general and special industrial machines including office machines and nonelectronic computing equipment; miscellaneous machines except electrical equipment and transportation equipment	9.5	12	14.5	5.5
35.21	**Manufacture of Other Machines—Special Tools:** Includes assets defined as special tools, such as jigs, dies, fixtures, molds, patterns, gauges, and specialty transfer and shipping devices, used in activities as defined in class 35.2. Special tools are specifically designed for the production or processing of particular machine components and				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	5	6.5	8	12.5
36.1	**Manufacture of Electrical Equipment:** Includes assets used in the production of machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy such as; electric test and distributing equipment, electrical industrial apparatus, household appliances, electric lighting and wiring equipment; electronic components and accessories, phonograph records, storage batteries and ignition systems	9.5	12	14.5	5.5
36.11	**Manufacture of Electrical Equipment Special Tools:** Includes assets defined as special tools such as jigs, dies, molds, patterns, fixtures, gauges, returnable containers, and specialty transfer devices used in activities as defined in class 36.1. Special tools are specifically designed for the production or processing of particular machine components, products or parts, and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	4	5	6	
36.2	**Manufacture of Electronic Products:** Includes assets used in the production of electronic detection, guidance, control, radiation, computation, test, and navigation equipment or the components thereof including airborne application. Also includes assets used in the manufacture of electronic airborne communication equipment or the components thereof. Does not include the assets of manufacturers engaged only in the purchase and assembly of components	6.5	8	9.5	7.5
37.11	**Manufacture of Motor Vehicles:** Includes assets used in the manufacture and assembly of finished automobiles, trucks, trailers, motor homes, and buses. Does not include assets used in mining, printing and publishing, production of primary metals, electricity, or steam, or the manufacture of glass, industrial chemicals, batteries, or rubber products, which are classified elsewhere. Includes assets used in manufacturing activities elsewhere classified other than those excluded above, where such activities are incidental to and an integral part of the manufacture and assembly of finished motor vehicles such as the manufacture of parts and subassemblies of fabricated metal products, electrical equipment, textiles, plastics, leather, and foundry and forging operations. Does not include any assets not classified in manufacturing activity classes, e.g., does not include assets classified in asset guideline classes 00.11 through 00.4. Activities will be considered incidental to the manufacture and assembly of finished				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	motor vehicles only if 75 percent or more of the value of the products produced under one roof are used for the manufacture and assembly of finished motor vehicles. Parts that are produced as a normal replacement stock complement in connection with the manufacture and assembly of finished motor vehicles are considered used for the manufacture and assembly of finished motor vehicles. Does not include assets used in the manufacture of component parts if these assets are used by taxpayer not engaged in the assembly of finished motor vehicles	9.5	12	14.5	9.5
37.12	**Manufacture of Motor Vehicles—Special Tools:** Includes assets defined as special tools, such as jigs, dies, fixtures, molds, patterns, gauges, and specialty transfer and shipping devices, owned by manufacturers of finished motor vehicles and used in qualified activities as defined in class 37.11. Special tools are specifically designed for the production or processing of particular motor vehicle components and have no significant utilitarian value, and cannot be adapted to further or different use, after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	2.5	3	3.5	12.5
37.2	**Manufacture of Aerospace Products:** Includes assets used in the manufacture and assembly of airborne vehicles and their component parts including hydraulic, pneumatic, electrical, and mechanical systems. Does not include assets used in the production of electronic airborne detection, guidance, control, radiation, computation, test, navigation, and communication equipment or the components thereof	8	10	12	7.5
37.31	**Ship and Boat Building Machinery and Equipment:** Includes assets used in the manufacture and repair of ships, boats, caissons, marine drilling rigs, and special fabrications not included in asset guideline classes 37.32 and 37.33. Specifically includes all manufacturing and repairing machinery and equipment, including machinery and equipment used in the operation of assets included in asset guideline class 37.32. Excludes buildings and their structural components	9.5	12	14.5	8.5
37.32	**Ship and Boat Building Dry Docks and Land Improvements:** Includes assets used in the manufacture and repair of ships, boats, caissons, marine drilling rigs, and special fabrications not included in asset guideline classes 37.31 and 37.33. Specifically includes floating and fixed dry docks, ship basins, graving docks, shipways, piers, and all other land improvements such as water, sewer, and electric systems. Excludes buildings and their structural components	13	16	19	2.5
37.33	**Ship and Boat Building—Special Tools:** Includes assets defined as special tools such as dies, jigs, molds, patterns, fixtures, gauges, and drawings concerning such special tools used in the activities defined in classes 37.31 and 37.32. Special tools are specifically designed for the production or processing of particular machine com-				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	ponents, products, or parts, and have no significant utilitarian value and cannot be adapted to further or different use after changes or improvements are made in the model design of the particular part produced by the special tools. Does not include general purpose small tools such as wrenches and drills, both hand and power-driven, and other general purpose equipment such as conveyors, transfer equipment, and materials handling devices	5	6.5	8	0.5
37.41	**Manufacture of Locomotives:** Includes assets used in building or rebuilding railroad locomotives (including mining and industrial locomotives). Does not include assets of railroad transportation companies or assets of companies which manufacture components of locomotives but do not manufacture finished locomotives	9	11.5	14	7.5
37.42	**Manufacture of Railroad Cars:** Includes assets used in building or rebuilding railroad freight or passenger cars (including rail transit cars). Does not include assets of railroad transportation companies or assets of companies which manufacture components of railroad cars but do not manufacture finished railroad cars	9.5	12	14.5	5.5
38.0	**Manufacture of Professional, Scientific, and Controlling Instruments:** Includes assets used in the manufacture of mechanical-measuring, engineering, laboratory and scientific research instruments, optical instruments and lenses; surgical, medical, and dental instruments, equipment and supplies; ophthalmic goods, photographic equipment and supplies; and watches and clocks	9.5	12	14.5	5.5
39.0	**Manufacture of Athletic, Jewelry and Other Goods:** Includes assets used in the production of jewelry; musical instruments; toys and sporting goods; motion picture and television films and tapes; and pens, pencils, office and art supplies, brooms, brushes, caskets, etc.	9.5	12	14.5	5.5
	Railroad Transportation: Classes with the prefix 40 include the assets identified below that are used in the commercial and contract carrying of passengers and freight by rail. Assets of electrified railroads will be classified in a manner corresponding to that set forth below for railroads not independently operated as electric lines. Excludes the assets included in classes with the prefix beginning 00.1 and 00.2 above, and also excludes any nondepreciable assets included in Interstate Commerce Commission accounts enumerated for this class.				
40.1	**Railroad Machinery and Equipment:** Includes assets classified in the following Interstate Commerce Commission accounts: Roadway Accounts: (16) Station and office buildings (freight handling machinery and equipment only) (25) TOFC/COFC terminals (freight handling machinery and equipment only)				

Asset guideline class	Description of assets included	Asset depreciation range (in years) Lower limit	Asset guideline period	Upper limit	Annual asset guideline repair allowance percentage
	(26) Communication systems (27) Signals and interlockers (37) Roadway machines (44) Shop machinery Equipment Accounts: (52) Locomotives (53) Freight train cars (54) Passenger train cars (57) Work equipment	11	14	17	10.5
40.2	**Railroad Structures and Similar Improvements:** Includes assets classified in the following Interstate Commerce Commission road accounts: (6) Bridges, trestles, and culverts (7) Elevated structures (13) Fences, snowsheds, and signs (16) Station and office buildings (stations and other operating structures only) (17) Roadway buildings (18) Water stations (19) Fuel stations (20) Shops and enginehouses (25) TOFC/COFC terminals (operating structures only) (31) Power transmission systems (35) Miscellaneous structures (39) Public improvements construction	24	30	36	5
40.3	**Railroad Wharves and Docks** Includes assets classified in the following Interstate Commerce accounts: (23) Wharves and docks (24) Coal and ore wharves	16	20	24	5.5
40.51	**Railroad Hydraulic Electric Generating Equipment**	40	50	60	1.5
40.52	**Railroad Nuclear Electric Generating Equipment**	16	20	24	3
40.53	**Railroad Steam Electric Generating Equipment**	22.5	28	33.5	2.5
40.54	**Railroad Steam, Compressed Air, and Other Power Plant Equipment**	22.5	28	33.5	7.5
41.0	**Motor Transport-Passengers:** Includes assets used in the urban and interurban commercial and contract carrying of passengers by road, except the transportation assets included in classes with the prefix 00.2	6.5	8	9.5	11.5
42.0	**Motor Transport-Freight:** Includes assets used in the commercial and contract carrying of freight by road, except the transportation assets included in classes with the prefix 00.2	6.5	8	9.5	11
44.0	**Water Transportation:** Includes assets used in the commercial and contract carrying of freight and passengers by water except the transportation assets included in classes with the prefix 00.2. Includes all related land improvements	16	20	24	8

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
45.0	**Air Transport:** Includes assets (except helicopters) used in commercial and contract carrying of passengers and freight by air. For purposes of section 1.167(a)-11(d)(2)(iv)(*a*) of the regulations, expenditures for "repair, maintenance, rehabilitation, or improvement" shall consist of direct maintenance expenses (irrespective of airworthiness provisions or charges) as defined by Civil Aeronautics Board uniform accounts 5200, maintenance burden (exclusive of expenses pertaining to maintenance buildings and improvements) as defined by Civil Aeronautics Board uniform accounts 5300, and expenditures which are not "excluded additions" as defined by section 1.167(a)-11(d)(2)(vi) of the regulations and which would be charged to property and equipment accounts in the Civil Aeronautics Board uniform system of accounts	9.5	12	14.5	15
45.1	**Air Transport (restricted)** Includes each asset described in the description of class 45.0 which was held by the taxpayer on April 15, 1976, or is acquired by the taxpayer pursuant to a contract which was, on April 15, 1976, and at all times thereafter, binding on the taxpayer. This criterion of classification based on binding contract concept is to be applied in the same manner as under the general rules expressed in section 49(b)(1), (4), (5), and (8) of the Code	5	6	7	15
46.0	**Pipeline Transportation:** Includes assets used in the private, commercial, and contract carrying of petroleum, gas, and other products by means of pipes and conveyors. The trunk lines and related storage facilities of integrated petroleum and natural gas producers are included in this class. Excludes initial clearing and grading land improvements as specified in Rev. Rul. 72-403, 1972-2 C.B. 102, but includes all other related land improvements	17.5	22	26.5	3
	Telephone Communications: Includes the assets identified below and that are used in the provision of commercial and contract telephonic services such as:				
48.11	**Telephone Central Office Buildings:** Includes assets intended to house central office equipment, as defined in Federal Communications Commission Part 31 Account No. 212 whether section 1245 or section 1250 property	36	45	54	1.5
48.12	**Telephone Central Office Equipment:** Includes central office switching and related equipment as defined in Federal Communications Commission Part 31 Account No. 221	16	20	24	6
48.13	**Telephone Station Equipment:** Includes such station apparatus and connections as teletypewriters, telephones, booths, private exchanges, and comparable equipment as defined in Federal Communications Commission Part 31 Account Nos. 231, 232, and 234	8	10	12	10
48.14	**Telephone Distribution Plant:** Includes such assets as pole lines, cable, aerial wire, underground con-				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	duits, and comparable equipment, and related land improvements as defined in Federal Communications Commission Part 31 Account Nos. 241, 242.1, 242.2, 242.3, 242.4, 243, and 244	28	35	42	2
48.2	**Radio and Television Broadcastings:** Includes assets used in radio and television broadcasting, except transmitting towers	5	6	7	10
	Telegraph, Ocean Cable, and Satellite Communications (TOCSC) Includes communications-related assets used to provide domestic and international radio-telegraph, wire-telegraph, ocean-cable, and satellite communications services; also includes related land improvements.				
48.31	**TOCSC-Electric Power Generating and Distribution Systems:** Includes assets used in the provision of electric power by generation, modulation, rectification, channelization, control, and distribution. Does not include these assets when they are installed on customer's premises	15	19	23	
48.32	**TOCSC-High Frequency Radio and Microwave Systems:** Includes assets such as transmitters and receivers, antenna supporting structures, antennas, transmission lines from equipment to antenna, transmitter cooling systems, and control and amplification equipment. Does not include cable and long-line systems	10.5	13	15.5	
48.33	**TOCSC-Cable and Long-line Systems:** Includes assets such as transmission lines, pole lines, ocean cables, buried cable and conduit, repeaters, repeater stations, and other related assets. Does not include high frequency radio or microwave systems	21	26.5	32	
48.34	**TOCSC-Central Office Control Equipment:** Includes assets for general control, switching, and monitoring of communications signals including electromechanical switching and channeling apparatus, multiplexing equipment, patching and monitoring facilities, in-house cabling, teleprinter equipment, and associated site improvements	13	16.5	20	
48.35	**TOCSC-Computerized Switching, Channeling, and Associated Control Equipment:** Includes central office switching computers, interfacing computers, other associated specialized control equipment, and site improvements	8.5	10.5	12.5	
48.36	**TOCSC-Satellite Ground Segment Property:** Includes assets such as fixed earth station equipment, antennas, satellite communications equipment, and interface equipment used in satellite communications. Does not include general purpose equipment or equipment used in satellite space segment property	8	10	12	
48.37	**TOCSC-Satellite Space Segment Property:** Includes satellites and equipment used for telemetry, tracking, control, and monitoring when used in satellite communications	6.5	8	9.5	

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
48.38	**TOCSC-Equipment Installed on Customer's Premises:** Includes assets installed on customer's premises, such as computers, terminal equipment, power generation and distribution systems, private switching center, teleprinters, facsimile equipment, and other associated and related equipment	8	10	12	
48.39	**TOCSC-Support and Service Equipment:** Includes assets used to support but not engage in communications. Includes store, warehouse, and shop tools, and test and laboratory assets	11	13.5	16	
	Cable Television (CATV): Includes communications-related assets used to provide cable television (community antenna television services). Does not include assets used to provide subscribers with two-way communications services.				
48.41	**CATV-Headend:** Includes assets such as towers, antennas, preamplifiers, converters, modulation equipment, and program non-duplication systems. Does not include headend buildings and program origination assets	9	11	13	5
48.42	**CATV-Subscriber Connection and Distribution Systems:** Includes assets such as trunk and feeder cable, connecting hardware, amplifiers, power equipment, passive devices, directional taps, pedestals, pressure taps, drop cables, matching transformers, multiple set connector equipment, and converters	8	10	12	5
48.43	**CATV-Program Origination:** Includes assets such as cameras, film chains, video tape recorders, lighting, and remote location equipment excluding vehicles. Does not include buildings and their structural components	7	9	11	9
48.44	**CATV-Service and Test:** Includes assets such as oscilloscopes, field strength meters, spectrum analyzers, and cable testing equipment, but does not include vehicles	7	8.5	10	2.5
48.45	**CATV-Microwave Systems:** Includes assets such as towers, antennas, transmitting and receiving equipment, and broad band microwave assets if used in the provision of cable television services. Does not include assets used in the provision of common carrier services	7.5	9.5	11.5	2
	Electric, Gas, Water and Steam, Utility Services: Includes assets used in the production, transmission and distribution of electricity, gas, steam, or water for sale, including related land improvements.				
49.11	**Electric Utility Hydraulic Production Plant:** Includes assets used in the hydraulic power production of electricity for sale, including related land improvements, such as dams, flumes, canals, and waterways	40	50	60	1.5
49.12	**Electric Utility Nuclear Production Plant:** Includes assets used in the nuclear power production of electricity for sale and related land improvements. Does not include nuclear fuel assemblies	16	20	24	3

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
49.121	**Electric Utility Nuclear Fuel Assemblies:** Includes initial core and replacement core nuclear fuel assemblies (i.e. the composite of fabricated nuclear fuel and container) when used in a boiling water, pressurized water, or high temperature gas reactor used in the production of electricity. Does not include nuclear fuel assemblies used in breeder reactors	4	5	6	
49.13	**Electric Utility Steam Production Plant:** Includes assets used in the steam power production of electricity for sale, combustion turbines operated in a combined cycle with a conventional steam unit and related land improvements	22.5	28	33.5	5
49.14	**Electric Utility Transmission and Distribution Plant:** Includes assets used in the transmission and distribution of electricity for sale and related land improvements. Excludes initial clearing and grading land improvements as specified in Rev. Rul. 72-403, 1972-2 C.B. 102	24	30	36	4.5
49.15	**Electric Utility Combustion Turbine Production Plant:** Includes assets used in the production of electricity for sale by the use of such prime movers as jet engines, combustion turbines, diesel engines, gasoline engines, and other internal combustion engines, their associated power turbines and/or generators, and related land improvements. Does not include combustion turbines operated in a combined cycle with a conventional steam unit	16	20	24	4
49.21	**Gas Utility Distribution Facilities:** Including gas water heaters and gas conversion equipment installed by utility on customers' premises on a rental basis	28	35	42	2
49.221	**Gas Utility Manufactured Gas Production Plants:** Includes assets used in the manufacture of gas having chemical and/or physical properties which do not permit complete interchangeability with domestic natural gas	24	30	36	2
49.222	**Gas Utility Substitute Natural Gas (SNG) Production Plant (naptha or lighter hydrocarbon feedstocks):** Includes assets used in the catalytic conversion of feedstocks of naphtha or lighter hydrocarbons to a gaseous fuel which is completely interchangeable with domestic natural gas	11	14	17	4.5
49.23	**Natural Gas Production Plant**	11	14	17	4.5
49.24	**Gas Utility Trunk Pipelines and Related Storage Facilities:** Excludes initial clearing and grading land improvements as specified in Rev. Rul. 72-403	17.5	22	26.5	3
49.25	**Liquefied Natural Gas Plant:** Includes assets used in the liquefaction, storage, and regasification of natural gas including loading and unloading connections, instrumentation equipment and controls, pumps, vaporizers and odorizers, tanks, and related land improvements. Also includes pipeline interconnections with gas transmission lines and distribution systems and marine terminal facilities	17.5	22	26.5	4.5

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	functions (e.g. food and beverage retailing, souvenir vending and other nonlodging accommodations) if owned by the park and provided exclusively for the benefit of park patrons. Theme and amusement parks are defined as combinations of amusements, rides, and attractions which are permanently situated on park land and open to the public for the price of admission. This guideline class is a composite of all assets used in this industry except transportation equipment (general purpose trucks, cars, airplanes, etc., which are included in asset guideline classes with the prefix 00.2), assets used in the provision of administrative services (asset guideline classes with the prefix 00.1), and warehouses, administration buildings, hotels and motels	10	12.5	15	12.5

SEC. 4. EFFECT ON OTHER DOCUMENTS.

Rev. Procs. 72-10, 73-2, 73-3, 73-23, 73-24, 73-25, 73-26, 73-27, 73-28, 73-30, 74-27, 74-28, 74-29, 74-30, 74-31, 74-32, 74-37, 74-50, 76-16 76-17, 76-18, 76-27, 76-37, 77-2, 77-3 and 77-8 are superseded for property placed in service in taxable years ending on or after March 21, 1977, the date of publication of this Revenue Procedure in the Internal Revenue Bulletin, in accordance with section 1.167(a)-11(b)(4) of the regulations. However, the taxpayer may at his option apply Rev. Proc. 72-10, as previously modified by the aforementioned documents, without regard to this Revenue Procedure for such property placed in service in a taxable year beginning before March 21, 1977, and ending on or after that date. Such option shall be exercised in making the election to apply section 1.167(a)-11 for such year and may not be revoked after the latest time for making such election.

The asset guideline classes, asset guideline depreciation periods and ranges, and asset guideline repair allowance percentages set forth in this Revenue Procedure will from time to time be supplemented and revised as provided by section 1.167(a)-11(b)(4) of the regulations. Taxpayers using this Revenue Procedure should apply it as supplemented and revised.

Rev. Proc. 78-4 [1]

SECTION 1. PURPOSE.

The purpose of this Revenue Procedure is to establish under section 1.167(a)-11 of the Income Tax Regulations a new class 35.0, Manufacture of Machinery, and to prescribe an asset guideline period, asset depreciation range, and annual asset guideline repair allowance percentage for the class. This new class replaces asset guideline classes 35.1, Manufacture of Metalworking Machinery, 35.11, Manufacture of Metalworking Machinery-Special Tools, 35.2, Manufacture of Other Machines, and 35.21, Manufacture of Other Machines-Special Tools.

Its further purpose is to modify the definition of asset guideline class 34.0, Manufacture of Fabricated Metal Products, to remove assets used in the manufacture of non-electric heating apparatus from that class. These assets, plus assets used to manufacture turbines that power electrical generators and assets used in the production of space heating, air-conditioning and ventilating equipment, and office machines and non-electronic computing equipment are now classified in asset guideline class 36.1, Manufacture of Electrical Equipment. There is no change in the asset guideline periods, the depreciation ranges, or annual asset guideline repair allowance percentages for classes 34.0 or 36.1.

The new and the modified asset guideline classes, asset guideline periods, asset depreciation ranges, and annual asset guideline repair allowance percentages are set forth in Section 2 of this Revenue Procedure.

SEC. 2. ASSET GUIDELINE CLASSES, ASSET GUIDELINE PERIODS, ASSET DEPRECIATION RANGES, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGES FOR ASSETS USED IN THE MANUFACTURE OF MACHINERY, MANUFACTURE OF FABRICATED METAL PRODUCTS, AND THE MANUFACTURE OF ELECTRICAL EQUIPMENT.

[1] Also release as IR-1925, dated December 30, 1977.

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
34.0	**Manufacture of Fabricated Metal Products:** Includes assets used in the production of metal cans, tinware, fabricated structural metal products, metal stampings, and other ferrous and non-ferrous metal and wire products not elsewhere classified. Does not include assets used to manufacture non-electric heating apparatus	9.5	12	14.5	6
35.0	**Manufacture of Machinery:** Includes assets used to manufacture or rebuild finished machinery and equipment and replacement parts thereof, such as metal cutting and forming machinery, dies, tools, jigs and fixtures, general industrial and special industry machinery, farm and garden machinery, construction machinery, mining and oil field machinery, turbines (except those that power electrical generators or airborne vehicles), and internal combustion engines (except those elsewhere classified). Includes assets used by manufacturers or rebuilders of such finished machinery and equipment in activities elsewhere classified such as the manufacture of castings, forgings, electronic products, rubber products, or other manufacturing classes if the products of these activities are used by the manufacturer primarily in the manufacture, assembly, or rebuilding of the finished machinery and equipment included in this class. Does not include assets used in mining, assets used in the manufacture of primary ferrous and non-ferrous metals, and those assets included in asset guideline classes 00.11 through 00.4	8	10	12	11
36.1	**Manufacture of Electrical Equipment:** Includes assets used in the production of machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and utilization of electric energy such as electrical generating equipment, electrical test and distributing equipment, electrical industrial apparatus, domestic and commercial appliances, space heating (including electrical and non-electric), air-conditioning and ventilating equipment, office machines and non-electronic computing equipment, electric lighting and wiring equipment, electronic components and accessories, phonograph records, storage batteries, and ignition systems	9.5	12	14.5	5.5

SEC. 3. EFFECT ON OTHER DOCUMENTS.

Rev. Proc. 77-10, 1977-1 C.B. 548, is modified by the establishment of the new class 35.0, Manufacture of Machinery, with an asset guideline period, asset depreciation range, and annual asset guideline repair allowance percentage for the class. This new class replaces asset guideline classes 35.1, Manufacture of Metalworking Machinery, 35.11, Manufacture of Metalworking Machinery-Special Tools, 35.2, Manufacture of Other Machines, and 35.21, Manufacture of Other Machines-Special Tools.

Rev. Proc. 77-10 is also modified by the revision of asset guideline classes 34.0, Manufacture of Fabricated Metal Products, and 36.1, Manufacture of Electrical Equipment.

SEC. 4. EFFECTIVE DATE.

The revisions set forth in this Revenue Procedure are effective for property placed in service in taxable years beginning after December 31, 1976.

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26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability.
(Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 78-5 [1]

SECTION 1. PURPOSE.

The purpose of this Revenue Procedure is to prescribe under section 1.167(a)-11 of the Income Tax Regulations a revised asset guideline class for assets used in the exploration for and production of petroleum and natural gas deposits to include assets used by petroleum and natural gas producers and others in the offshore pipeline transportation of oil and natural gas. These assets were formerly included in Class 46.0.

The revised asset guideline class, the associated asset guideline depreciation period and range, and annual asset guideline repair allowance percentage are set forth in Section 2 of this Revenue Procedure.

SEC. 2. ASSET GUIDELINE CLASS, ASSET GUIDELINE DEPRECIATION PERIOD AND RANGE, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGE FOR ASSETS USED IN THE EXPLORATION FOR AND PRODUCTION OF PETROLEUM AND NATURAL GAS DEPOSITS.

The asset guideline class, asset guideline depreciation period and range, and the annual asset guideline repair allowance percentage are prescribed as set forth below.

[1] Also released as News Release IR-1924, dated December 30, 1977.

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
13.2	**Exploration for and Production of Petroleum and Natural Gas Deposits:** Includes assets used by petroleum and natural gas producers for drilling of wells and production of petroleum and natural gas, including gathering pipelines and related storage facilities. Also includes petroleum and natural gas offshore transportation facilities used by producers and others consisting of platforms (other than drilling platforms classified in Class 15.2), compression and pumping equipment, and gathering and transmission lines to the first onshore transshipment facility. The assets used in the first onshore transshipment facility are also included and consist of separation equipment (used for separation of natural gas, liquids, and solids), compression or pumping equipment (other than equipment classified in Class 49.23), and liquid holding or storage facilities (other than those classified in Class 49.25). Does not include support vessels	11	14	17	4.5

SEC. 3. EFFECT ON OTHER DOCUMENTS.

Rev. Proc. 77-10, 1977-1 C.B. 548, is modified by the prescription of revised asset guideline class 13.2, Exploration for and Production of Petroleum and Natural Gas Deposits, with the associated asset guideline depreciation period and range and annual asset guideline repair allowance percentage as set forth in Section 2 of this Revenue Procedure. Class 13.2, as modified, now includes offshore transportation asset formerly included in Class 46.0.

SEC. 4 EFFECTIVE DATE.

The asset guideline class, asset guideline depreciation period and range, and the annual asset guideline repair allowance percentage for the activity class set forth in this Revenue Procedure are effective for property first placed in service in taxable years beginning after December 31, 1976.

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26 CFR 601.204: Changes in accounting periods and in methods of accounting.
(Also Part I, Sections 446, 481, 805, 809, 815; 1.446-1, 1.481-1, 1.805-4, 1.809-4, 1.815-4.)

Rev. Proc. 79-26

SECTION 1. PURPOSE.

In this Revenue Procedure, the Assistant Secretary (Tax Policy) of the Treasury prescribes certain changes with respect to the Class Life Asset Depreciation Range System. One purpose of this Revenue Procedure is to establish a new asset guideline class for assets used in waste reduction and resource recovery plants, formerly included in class 39.0, an asset guideline depreciation period and range, and annual asset guideline repair allowance percentage. A further purpose is to modify the asset guideline depreciation period and range for asset guideline class 00.4, Industrial Steam and Electric Generation and/or Distribution Systems, and to prescribe other clarified asset guideline classes containing related activities. These changes are adopted pursuant to section 1.167(a)-11 of the Income Tax Regulations.

The new and clarified asset guideline classes, asset guideline depreciation periods and ranges, and annual asset guideline repair allowance percentages are set forth in Section 2 of this Revenue Procedure.

SEC. 2. ASSET GUIDELINE CLASSES, ASSET DEPRECIATION PERIODS AND RANGES, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGES FOR ASSETS USED IN WASTE REDUCTION AND RESOURCE RECOVERY PLANT, CENTRAL STEAM UTILITY PRODUCTION AND DISTRIBUTION, ELECTRIC UTILITY STEAM PRODUCTION PLANT, GAS UTILITY MANUFACTURED GAS PRODUCTION PLANTS, AND INDUSTRIAL STEAM AND ELECTRIC GENERATION AND/OR DISTRIBUTION SYSTEMS.

The asset guideline classes, asset guideline depreciation periods and ranges, and annual asset guideline repair allowance percentages are prescribed as set forth below.

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
00.4	Industrial Steam and Electric Generation and/or Distribution Systems: Includes assets, whether such assets are section 1245 property or 1250 property, providing such assets are depreciable, used in the production and/or distribution of electricity with rated total capacity in excess of 500 Kilowatts and/or assets used in the production and/or distribution of steam with rated total capacity in excess of 12,500 pounds per hour for use by the taxpayer in his industrial manufacturing process or plant activity and not ordinarily available for sale to others. Does not include buildings and structural components as defined in section 1.48-1(e) of the regulations. Assets used to generate and/or distribute electricity or steam of the type described above but of lesser rated capacity are not included, but are included in the appropriate manufacturing equipment classes elsewhere specified. Also includes				

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
	electric generating and steam distribution assets, which may utilize steam produced by a waste reduction and resource recovery plant, used by the taxpayer in his industrial manufacturing process or plant activity. Steam and chemical recovery boiler systems used for the recovery and regeneration of chemicals used in manufacturing, with rated capacity in excess of that described above, with specifically related distribution and return systems are not included but are included in appropriate manufacturing equipment classes elsewhere specified. An example of an excluded steam and chemical recovery boiler system is that used in the pulp and paper manufacturing industry	17.5	22	26.5	2.5
49.13	Electric Utility Steam Production Plant: Includes assets used in the steam power production of electricity for sale, combustion turbines operated in a combined cycle with a conventional steam unit and related land improvements. Also includes package boilers, electric generators and related assets such as electricity and steam distribution systems as used by a waste reduction and resource recovery plant if the steam or electricity is normally for sale to others	22.5	28	33.5	5.0
49.221	Gas Utility Manufactured Gas Production Plants: Includes assets used in the manufacture of gas having chemical and/or physical properties which do not permit complete interchangeability with domestic natural gas. Does not include gas producing systems and related systems used in waste reduction and resource recovery plants which are elsewhere classified	24	30	36	2.0
49.4	Central Steam Utility Production and Distribution: Includes assets used in the production and distribution of steam for sale. Does not include assets used in waste reduction and resource recovery plants which are elsewhere classified	22.5	28	33.5	2.5

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
49.5	Waste Reduction and Resource Recovery Plants: Includes assets used in the conservation of refuse or other solid waste or biomass to heat or to a solid, liquid, or gaseous fuel. Also includes all process plant equipment and structures at the site used to receive, handle, collect, and process refuse or other solid waste or biomass to a solid, liquid, or gaseous fuel or to handle and burn refuse or other solid waste or biomass in a waterwall combustion system, oil or gas pyrolysis system, or refuse derived fuel system to create hot water, gas, steam and electricity. Includes material recovery and support assets used in refuse or solid refuse or solid waste receiving, collecting, handling, sorting, shredding, classifying, and separation systems. Does not include any package boilers, or electric generators and related assets such as electricity, hot water, steam and manufactured gas production plants classified in classes 00.4, 49.13, 49.221, and 49.4. Does include, however, all other utilities such as water supply and treatment facilities, ash handling and other related land improvements of a waste reduction and resource recovery plant	8	10	12	15.0

SEC. 3. EFFECT ON OTHER DOCUMENTS.

Rev. Proc. 77-10, 1977-1 C.B. 548, is modified by the establishment of the new asset guideline class 49.5, Waste Reduction and Resource Recovery Plant, with an asset guideline depreciation period, range, and annual asset guideline repair allowance percentage. This new class modifies the content of assets guideline class 39.0, Manufacture of Athletic, Jewelry and Other Goods. Rev. Proc. 77-10 is modified by the revision of guideline class 00.4, Industrial Steam and Electric Generation and/or Distribution Systems, and its asset guideline depreciation period and range, and by revisions of related activities described in guideline classes 49.13, Electric Utility Steam Production Plant, 49.221, Gas Utility Manufactured Gas Production Plants and 49.4, Central Steam Utility Production and Distribution.

SEC. 4. EFFECTIVE DATE.

The revisions set forth in this Revenue Procedure are effective for property first placed in service in taxable years beginning after December 31, 1978.

26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability.
(Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 79-35

SECTION 1. PURPOSE.

The Assistant Secretary (Tax Policy) of the Treasury prescribes, in this Revenue Procedure, under section 1.167(a)-11 of the Income Tax Regulations, a revised class 28.0, Manufacture of Chemicals and Allied Products, with an associated asset guideline period and ranges, and annual asset guideline repair allowance percentage; and a revised class 38.0, Manufacture of Professional, Scientific and Controlling Instruments.

The revised guideline classes, and associated asset guideline depreciation periods, asset depreciation ranges, and annual asset guideline repair allowance percentages are set forth in Section 2 of this Revenue Procedure.

SEC. 2. ASSET GUIDELINE CLASSES AND PERIODS, ASSET DEPRECIATION RANGES, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGES FOR ASSETS USED IN THE MANUFACTURE OF CHEMICALS AND ALLIED PRODUCTS AND IN THE MANUFACTURE OF PROFESSIONAL, SCIENTIFIC AND CONTROLLING INSTRUMENTS.

The asset guideline classes, asset guideline depreciation periods and ranges, and annual asset guideline repair allowance percentages are prescribed as set forth below.

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
28.0	Manufacture of Chemicals and Allied Products: Includes assets used to manufacture basic organic and inorganic chemicals; chemical products to be used in further manufacture, such as synthetic fibers and plastics materials; and finished chemical products. Includes assets used to further process man-made fibers, to manufacture plastic film, and to manufacture nonwoven fabrics, when such assets are located in the same plant in an integrated operation with chemical products producing assets. Also includes assets used to manufacture photographic supplies, such as film, photographic paper, sensitized photographic paper, and developing chemicals. Includes all land improvements associated with plant site or production processes, such as effluent ponds and canals, provided such land improvements are depreciable but does not include buildings and structural components as defined in section 1.48-1(e) of the regulations. Does not include assets used in the manufacture of finished rubber and plastic products or in the production of natural gas products, butane, propane, and byproducts of natural gas production plants	7.5	9.5	11.5	12.5
38.0	Manufacture of Professional, Scientific, and Controlling Instruments: Includes assets used in the manufacture of mechanical measuring, engineering, laboratory and scientific research instruments, optical instruments and lenses; surgical, medical, and dental instruments, equipment and supplies; ophthalmic goods, photographic equipment, and watches and clocks	9.5	12.0	14.5	5.5

SEC. 3. EFFECT ON OTHER DOCUMENTS.

Rev. Proc. 77-10, 1977-1 C.B. 548, is modified by the establishment of a revised guideline class 28.0, Manufacture of Chemicals and Allied Products, with revised asset guideline period and ranges, and an annual asset guideline repair allowance percentage and a revised guidelines class 38.0, Manufacture of Professional, Scientific, and Controlling Instruments. Revised class 28.0 includes assets used to manufacture photographic supplies which were formerly in Class 38.0, Manufacture of Professional, Scientific and Controlling Instruments, as well as land improvement assets formerly included in class 00.3, Land Improvements.

SEC. 4. EFFECTIVE DATE.

The revisions set forth in this Revenue Procedure are effective for property placed in service in taxable years beginning after December 31, 1978.

26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability.
(Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 79-41

SECTION 1. PURPOSE

In this Revenue Procedure, the Assistant Secretary (Tax Policy) of the Treasury prescribes certain changes with respect to the Class Life Asset Depreciation Range System. One purpose of this Revenue Procedure is to eliminate existing asset guideline classes 33.1 (Manufacture of Primary Ferrous Metals) and 33.11 (Manufacture of Primary Ferrous Metals—Special Tools). A further purpose is to establish a new asset guideline class, depreciation period and range, and annual repair allowance percentage for assets used in the manufacture of foundry products, formerly included in classes 33.1 and 33.11 (Rev. Proc. 79-42, relating to property used in the manufacture of primary steel mill products, prescribes changes for the other assets formerly included in classes 33.1 and 33.11.) These changes are adopted pursuant to section 1.167(a)-11 of the Income Tax Regulations.

SEC. 2. ASSET GUIDELINE CLASS, ASSET GUIDELINE DEPRECIATION PERIOD AND RANGE, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGE FOR ASSETS USED IN THE MANUFACTURE OF FOUNDRY PRODUCTS

The new asset guideline class, asset guideline depreciation period and range, and the annual asset guideline repair allowance percentage are prescribed as set forth below.

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years)			Annual Asset Guideline Repair Allowance Percentage
		Lower Limit	Asset Guideline Period	Upper Limit	
33.3	Manufacture of Foundry Products: Includes assets used in the casting of iron and steel, including related operations such as molding and coremaking. Also includes assets used in the finishing of castings and pattern-making when performed at the foundry, all special tools and related land improvements	11	14	17	18

SEC. 3. EFFECT ON OTHER DOCUMENTS

Rev. Proc. 77-10, 1977-1 C.B. 548, as modified, is further modified by the elimination of existing asset guideline classes 33.1 (Manufacture of Primary Ferrous Metals) and 33.11 (Manufacture of Primary Ferrous Metals - Special Tools) and the prescription of a new asset guideline class 33.3, Manufacture of Foundry Products, with a new asset guideline depreciation period and range and annual asset guideline repair percentage.

SEC. 4. EFFECTIVE DATE

The revision set forth in this Revenue Procedure is effective for property placed in service in taxable years ending on or after August 17, 1979.

26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability.
(Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 79-42

SECTION 1. PURPOSE

In this Revenue Procedure, the Assistant Secretary (Tax Policy) of the Treasury prescribes certain changes with respect to the Class Life Asset Depreciation Range System. The purpose of this Revenue Procedure is to establish under section 1.167(a)-11 of the Income Tax Regulations a new asset guideline class, depreciation period and range and annual repair allowance percentage for assets used in the manufacture of primary steel mill products. These assets were formerly included in asset guideline classes 33.1 (Manufacture of Primary Ferrous Metals) and 33.11 (Manufacture of Primary Ferrous Metals—Special Tools).

The new asset guideline class, asset guideline period and range, and annual asset guideline repair allowance percentage are set forth in Section 2 of this Revenue Procedure.

SEC. 2. ASSET GUIDELINE CLASS, ASSET GUIDELINE DEPRECIATION PERIOD AND RANGE, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGE FOR ASSETS USED IN THE MANUFACTURE OF PRIMARY STEEL MILL PRODUCTS

The new asset guideline class, asset guideline depreciation period and range, and the annual asset guideline repair allowance percentage are prescribed as set forth below.

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
33.4	Manufacture of Primary Steel Mill Products: Includes assets used in the smelting, reduction, and refining of iron and steel from ore, pig, or scrap; the rolling, drawing and alloying of steel; the manufacture of nails, spikes, structural shapes, tubing, wire, and cable. Includes assets used by steel service centers, ferrous metal forges, and assets used in coke production, regardless of ownership. Also includes related land improvements and all special tools used in the above activities	12	15	18	18

SEC. 3. EFFECT ON OTHER DOCUMENTS

Rev. Proc. 77-10, 1977-1 C.B. 548, as modified, is further modified by the prescription of a new asset guideline class 33.4 (Manufacture of Primary Steel Mill Products), with a new asset guideline depreciation period and range and annual asset guideline repair percentage.

SEC. 4. EFFECTIVE DATE

This revenue procedure is effective for assets placed in service during a taxpayer's first taxable year ending on or after August 17, 1979 and for assets placed in service during the four succeeding consecutive taxable years. For instance, in the case of a calendar year taxpayer this revenue procedure is effective for assets placed in service through the taxable year ending December 31, 1983.

26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability.
(Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 79-60

SECTION 1. PURPOSE.

The purpose of this revenue procedure is to modify section 2.02(i) of Rev. Proc. 77-10, 1977-1 C.B. 548, which provides a special rule of application regarding certain asset guideline classes and subclasses of Class Life Asset Depreciation Range (CLADR) system.

SECTION 2. BACKGROUND.

.01 Section 1.167(a)-11(b)(4)(ii) of the Income Tax Regulations provides that when asset guideline periods or the lower limit of the asset depreciation range are supplemented or revised, the asset guideline period or lower limit of the asset depreciation range shall not be longer for any vintage account than that in effect for the first day of the taxable year.

.02 If a new class is established by combining a class with long-lived assets and a subclass with short-lived assets, the asset depreciation range of the new class is determined by weighting the lives of all the assets. If a taxpayer were able to exclude all the short-lived assets from the new class, the lives of the remaining assets would not reflect the asset depreciation range of the new class.

SECTION 3. CHANGE.

Section 2.02(i) of Rev. Proc. 77-10 is modified to read as follows:

"It is expressly provided that asset guideline classes and subclasses 00.4, 20.5, 30.11, 30.21, 32.11, 33.11, 33.21, 34.01, 35.11, 35.21, 36.11, 37.12, 37.32, 37.33, and 49.121 are part of existing activity classes to which the assets included in them relate as stated in the revenue procedures establishing these subclasses; therefore, assets included in these classes and subclasses are not separately subject to possible exclusion from an election to apply sections 1.167(a)-11(b)(4)(ii) and 1.167(a)-11(b)(5)(v) of the Income Tax Regulations."

SECTION 4. APPLICATION.

The following examples set forth the application of the revision of section 2.02(i) of Rev. Proc. 77-10:

Example 1

During 1979, class Y (asset depreciation range, 11-17 years) and subclass Y.1 (asset depreciation range, 4-6 years) are established effective for assets placed in service in taxable years ending after the date of publication of the revenue procedure establishing classes Y and Y.1. The assets in class Y and subclass Y.1 formerly were included in class X (asset depreciation range, 8-12 years). For the first taxable year ending after the date of publication of the revenue procedure establishing classes Y and Y.1, a taxpayer has the option of using (1) class X or (2) class Y and subclass Y.1. The taxpayer may not use subclass Y.1 for the assets described in that subclass and class X for the remaining assets.

Example 2

During 1979, class Z (asset depreciation range, 16-24 years) is established effective for assets placed in service in taxable years ending after the date of publication of the revenue procedure establishing class Z. The assets in this class formerly were included in class W (asset depreciation range, 22-34 years), and subclass W.1 (asset depreciation range, 4-6 years). For the first taxable year ending after the date of publication of the revenue procedure establishing class Z, a taxpayer has the option of using (1) class W and subclass W.1 or (2) class Z.

The taxpayer may not use subclass W.1 for the assets described in that subclass and class Z for the remaining assets.

SECTION 5. EFFECT ON OTHER DOCUMENTS.

Rev. Proc. 77-10, Section 2.02(i) is modified to the extent set forth in section 3 of this Revenue Procedure.

SECTION 6. EFFECTIVE DATE.

This Revenue Procedure is effective for property placed in service in taxable years ending after December 3, 1979, the date of publication of this Revenue Procedure in the Internal Revenue Bulletin.

26 CFR 601.105: Examinations of returns and claims for refund, credit or abatement; determination of correct tax liability.
(Also Part I, Sections 167, 263; 1.167(a)-11, 1.263(f)-1.)

Rev. Proc. 79-64

In this Revenue Procedure, the Assistant Secretary (Tax Policy) of the Treasury prescribes a revised Annual Asset Guideline Repair Allowance Percentage for Asset Guideline Class 40.1, Railroad Machinery and Equipment, of 16.5. This change is effective for taxable years ending on or after December 31, 1979. The Description of Assets Included, Asset Guideline Period, and Asset Depreciation Range of Class 40.1 remain unchanged.

Rev. Proc. 77-10, 1977-1 C.B. 548, is modified.

26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability.
(Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 79-65

SECTION 1. PURPOSE

The Assistant Secretary (Tax Policy) of the Treasury prescribes, in this Revenue Procedure, under section 1.167(a)-11 of the Income Tax Regulations, a revised class 35.0, Manufacture of Electrical and Non-Electrical Machinery and Other Mechanical Products; a new class 36.0, Manufacture of Electronic Components, Products, and Systems; and a revised class 22.3, Manufacture of Carpets, and Dyeing, Finishing, and Packaging of Textile Products and Manufacture of Medical and Dental Supplies.

The new and revised asset guideline classes, and associated asset guideline depreciation periods, asset depreciation range periods, and annual asset guideline repair allowance percentages are set forth in Section 2 of this Revenue Procedure.

SEC. 2. ASSET GUIDELINE CLASSES, ASSET GUIDELINE PERIODS, ASSET DEPRECIATION RANGES, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGES

The asset guideline classes, asset guideline periods, asset depreciation ranges, and annual asset guideline repair allowance percentages are prescribed as set forth below.

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
22.3	**Manufacture of Carpets, and Dyeing, Finishing, and Packaging of Textile Products and Manufacture of Medical and Dental Supplies:** Includes assets used in the production of carpets, rugs, mats, woven carpet backing, chenille, and other tufted products, and assets used in the joining together of backing with carpet yarn or fabric. Includes assets used in washing, scouring, bleaching, dyeing, printing, drying, and similar finishing processes applied to textile fabrics, yarns, threads, and other textile goods. Includes assets used in the production and packaging of textile products, other than apparel, by creasing, forming, trimming, cutting, and sewing, such as the preparation of carpet and fabric samples, or similar joining together processes (other than the production of scrim reinforced paper products and laminated paper products) such as the sewing and folding of hosiery and panty hose, and the creasing, folding, trimming, and cutting of fabrics to produce nonwoven products, such as disposable diapers and sanitary products. Also includes assets used in the production of medical and dental supplies other than drugs and medicines. Assets used in the manufacture of nonwoven carpet backing, and hard surface floor covering such as tile, rubber, and cork, are elsewhere classified	7	9	11	15
35.0	**Manufacture of Electrical and Non-Electrical Machinery and Other Mechanical Products:** Includes assets used to manufacture or rebuild finished machinery and equipment and replacement parts thereof such as machine tools, general industrial and special industry machinery, electrical power generation, transmission, and distribution systems, space heating, cooling, and refrigeration systems, commercial and home appliances, farm and garden machinery, construction machinery, mining and oil field machinery, internal combustion engines (except those elsewhere classified), turbines (except those that power airborne vehicles), batteries, lamps and lighting fixtures, carbon and graphite products, and electro-				

Asset guideline class	Description of assets included	Asset depreciation range (in years)			Annual asset guideline repair allowance percentage
		Lower limit	Asset guideline period	Upper limit	
	mechanical and mechanical products including business machines, instruments, watches and clocks, vending and amusement machines, photographic equipment, medical and dental equipment and appliances, and ophthalmic goods. Includes assets used by manufacturers or rebuilders of such finished machinery and equipment in activities elsewhere classified such as the manufacture of castings, forgings, rubber and plastic products, electronic subassemblies or other manufacturing activities if the interim products are used by the same manufacturer primarily in the manufacture, assembly, or rebuilding of such finished machinery and equipment. Does not include assets used in mining, assets used in the manufacture of primary ferrous and nonferrous metals, assets included in guideline class 00.11 through 00.4 and assets elsewhere classified	8	10	12	11
36.0	**Manufacture of Electronic Components, Products, and Systems:**				
	Includes assets used in the manufacture of electronic communication, computation, instrumentation and control systems, including airborne applications; also includes assets used in the manufacture of electronic products such as frequency and amplitude modulated transmitters and receivers, electronic switching stations, television cameras, video recorders, record players and tape recorders, computers and computer peripheral machines, and electronic instruments, watches, and clocks; also includes assets used in the manufacture of components, provided their primary use is in products and systems defined above such as semiconductors, electron tubes, capacitors, coils, resistors, printed circuit substrates, switches, harness cables, lasers, fiber optic devices, and magnetic media devices. Specifically excludes assets used to manufacture electronic products and components, photocopiers, typewriters, postage meters and other electromechanical and mechanical business machines and instruments that are elsewhere classified	5	6	7	8

SEC. 3. EFFECT ON OTHER DOCUMENTS

Rev. Proc. 77-10, 1977-1 C.B. 548, as revised by Rev. Proc. 78-4, 1978-1 C.B. 555, and by Rev. Proc 79-35, 1979-29 I.R.B. 13, is modified by the revision of class 35.0, Manufacture of Machinery, and deletion of classes 36.1, Manufacture of Electrical Equipment; 36.11, Manufacture of Electrical Equipment—Special Tools; 36.2, Manufacture of Electronic Products; and 38.0, Manufacture of Professional, Scientific, and Controlling Instruments.

Rev. Proc. 77-10, as subsequently modified, is revised by the revision and new designation of class 35.0 as Manufacture of Electrical and Non-Electrical Machinery and Other Mechanical Products. Revised class 35.0 includes assets used to manufacture machinery formerly included in that class, assets used to manufacture electrical equipment formerly included in classes 36.1 and 36.11, and assets used to manufacture electromechanical and mechanical products including instruments, medical and dental equipment and appliances, photographic equipment, and ophthalmic goods formerly included in class 38.0.

Rev. Proc. 77-10 is also revised by the prescription of new class 36.0, Manufacture of Electronic Components, Products, and Systems. New class 36.0 includes assets used to manufacture electronic products, components and accessories formerly included in classes 36.1 and 36.11, electronic products formerly included in class 36.2, and electronic instruments, watches, and clocks formerly included in class 38.0.

Rev. Proc. 77-10 is also modified by the revision of class 22.3, now designated Manufacture of Carpets, and Dyeing, Finishing, and Packaging of Textile Products and Manufacture of Medical and Dental Supplies. Revised class 22.3 includes assets used to manufacture medical and dental supplies that were formerly included in class 38.0.

SEC. 4. EFFECTIVE DATE

This Revenue Procedure is effective for assets placed in service in taxable years ending on or after December 31, 1979.

26 CFR 601.105: Examination of returns and claims for refund, credit, or abatement; determination of correct tax liability. (Also Part I, Section 167; 1.167(a)-11.)

Rev. Proc. 80-15

SECTION 1. PURPOSE

In this revenue procedure, the Assistant Secretary (Tax Policy) of the Treasury prescribes certain changes with respect to the Class Life Asset Depreciation Range System. One purpose of this Revenue Procedure is to establish under section 1.167(a)-11 of the Income Tax Regulations a new class 57.0, Distributive Trades and Services, and a new class 57.1, Distributive Trades and Services—Billboards, Service Station Buildings and Petroleum Marketing Land Improvements. A further purpose is to clarify the description of assets included in class 00.12, Information Systems.

Class 57.0 includes assets formerly included in classes 13.4, Marketing of Petroleum and Petroleum Products (section 1245 property), 50.0, Wholesale and Retail Trade, 70.2, Personal and Professional Services, and 50.1 and 70.21 (Service Assets). Class 57.1 includes assets formerly included in class 13.4, Marketing of Petroleum and Petroleum Products (Section 1250 property, including service station buildings and all depreciable land improvements).

The new and clarified asset guideline classes, and associated asset guideline depreciation periods, asset depreciation ranges, and annual asset guideline repair allowance percentages are set forth in Section 2 of this Revenue Procedure.

SEC. 2. ASSET GUIDELINE CLASSES, ASSET GUIDELINE PERIODS, ASSET DEPRECIATION RANGES, AND ANNUAL ASSET GUIDELINE REPAIR ALLOWANCE PERCENTAGES

The asset guideline classes, asset guideline periods, asset depreciation ranges, and annual asset guideline repair allowance percentages are prescribed as set forth below.

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years)			Annual Asset Guideline Repair Allowance Percentage
		Lower Limit	Asset Guideline Period	Upper Limit	
00.12	Information Systems: Includes computers and their peripheral equipment used in administering normal business transactions and the maintenance of business records, their retrieval and analysis. Information systems are defined as: 1) Computers: A computer is an electronically activated device capable of accepting information, applying prescribed processes to the information, and supplying the results of these processes with or without human intervention. It usually consists of a central processing unit containing extensive storage, logic, arithmetic, and control capabilities. Excluded from this category are adding machines, electronic desk calculators, etc. 2) Peripheral equipment consists of the auxiliary machines that may be placed under control of the central processing unit. Non-limiting examples are: Card readers, card punches, magnetic tape feeds, high speed printers, optical character readers, tape cassettes, mass storage units, paper tape equipment, keypunches, data entry devices, teleprinters, terminals, tape drives, disc drives, disc files, disc packs, visual image projector tubes, card sorters, plotters, and collators. Peripheral equipment may be used on-line or off-line. Does not include equipment that is an integral part of other capital equipment that is included in other CLADR classes of economic activity, i.e., computers used primarily for process or production control, switching, channeling, and automating distributive trades and services such as point of sale (POS) computer systems	5	6	7	7.5
57.0	Distributive Trades and Services: Includes assets used in wholesale and retail trade, and personal and professional services. Includes Section 1245 assets used in marketing petroleum and petroleum products	7	9	11	8

Asset Guideline Class	Description of Assets Included	Asset Depreciation Range (in years) Lower Limit	Asset Guideline Period	Upper Limit	Annual Asset Guideline Repair Allowance Percentage
57.1	Disrtibutive Trades and Services—Billboard, Service Station Buildings and Petroleum Marketing Land Improvements: Includes section 1250 assets, including service station buildings and depreciable land improvements, whether section 1245 property or section 1250 property, used in the marketing of petroleum and petroleum products, but not including any of these facilities related to petroleum and natural gas trunk pipelines. Includes car wash buildings and related land improvements. Includes billboards, whether such assets are section 1245 property or section 1250 property. Excludes all other land improvements, buildings and structural components as defined in section 1.48-1(e) of the regulations	16	20	24	5

SEC. 3. EFFECT ON OTHER DOCUMENTS

Rev. Proc. 77-10, 1977-1 C.B. 548, as modified, is further modified by the deletion of classes 13.4, Marketing of Petroleum and Petroleum Products; 50.0, Wholesale and Retail Trade; 50.1, Wholesale and Retail Trade Service Assets; 70.2, Personal and Professional Services; and 70.21, Personal and Professional Services Service Assets.

Rev. Proc. 77-10, as subsequently modified, is revised by the prescription of new classes 57.0, Distributive Trades and Services, and 57.1, Distributive Trades and Services--Billboards, Service Station Buildings and Petroleum Marketing Land Improvements, and the clarification of class 00.12, Information Systems.

SEC. 4. EFFECTIVE DATE

This revenue procedure is effective for assets placed in service in taxable years ending on or after April 28, 1980. For taxable years ending prior to April 28, 1980, distributive trades and services automated equipment such as POS computer systems described herein are properly classified in asset guideline class 00.12, 50.0, or 70.2, depending upon which class was selected by the taxpayer on its original return.

ATTACHMENT V

WORKSHEETS

This attachment contains worksheets which can be used to calculate input data. Each worksheet will also contain reminders for points which may be overlooked in calculations.

WORKSHEET A

CALCULATION OF THE CAPITAL EXPENDITURE INPUT

1.	List price or estimated price of the equipment:	$
2.	Less: Discount from manufacturer =	
3.	Equals net price of equipment =	
4.	Plus: Sales tax on equipment[1] =	
5.	Plus: Freight and delivery charge =	
6.	Plus: Installation charge =	
7.	Equals estimated cost of equipment installed =	
8.	Plus: Value of lost production =	
9.	Plus: Cost of building construction or modifications =	
10.	Equals TOTAL CAPITAL EXPENDITURE =	$

Note: Line 7 divided by line 10 is the percentage of qualified investment for calculation of the investment tax credit.

QUALIFIED PERCENTAGE INVESTMENT TAX CREDIT

$\frac{\text{Line 7}}{\text{Line 10}}$ = _____ X 10 = _____%

If the depreciable life of the equipment is less than 7 years, this figure must be adjusted as described on page II-16.

[1]Some corporations subtract sales tax from revenue in the year of purchase. If this is the case, the sales tax is multiplied by (1 - Tax Rate) and subtracted from the cost of the equipment rather than added as in Step 4.

WORKSHEET B

OPERATING AND MAINTENANCE EXPENSE[1]

1. Annual Labor Expense

   _____ hours x $_____ per hour = _____

2. Power Cost

   _____ kwh x $_____ per kwh = _____

3. Water Cost

   _____ gallons x $_____ per gallon = _____

4. Raw Materials and Supplies

   _____ lbs. x $_____ per lb. = _____

5. Yearly Increase in Property Tax = _____

6. Cost of Production Lost Due to Maintenance or Use of Equipment = _____

7. TOTAL COST (1 + 2 + 3 + 4 + 5 + 6) = _____

8. Less: Value of Byproducts

   _____ lbs. at $_____ per lb. = _____

9. Annual Operating and Maintenance (7-8) = _____

10. AVERAGE MONTHLY OPERATING AND MAINTENANCE (9÷12) $_____

[1] All costs should be stated in dollars as of the date compliance is expected to be achieved.

WORKSHEET C

CALCULATION OF INCOME TAX RATE

1. Marginal Federal Tax Rate _____
2. Marginal State Tax Rate _____
3. Marginal Local Tax Rate _____

CALCULATION OF ADJUSTED LOCAL TAX

(1 - State Tax Rate) x Local Tax Rate

= (1 - _____) x _____

= _____ x _____

= _____ = Adjusted Local Tax Rate

CALCULATION OF ADJUSTED STATE AND LOCAL TAX

(1 - Federal Tax Rate) x (State Tax Rate + Adjusted Local Rate)

= (1 - _____) x (_____ + _____)

= _____ x _____

= _____ = Adjusted Local State Tax

CALCULATION OF TAX RATE

100 x (Federal Tax Rate + Adjusted Local and State Tax)

= 100 x (_____ + _____)

= 100 x _____

= _____ = Tax Rate

WORKSHEET D

WEIGHTED AVERAGE INTEREST RATE

1. Total Capital Expenditure _____

2. Debt Percent of the Investment _____

3. Amount of the Investment Financed with Debt

   (1) _____ * (2) _____ ÷ 100 = _____

4. Dollar Value of Issued Industrial Development Bonds _____

5. Interest Rate on Corporate (or Public Utility) Bonds _____

6. Interest Rate on Industrial Development Bonds _____

A. If (4) is larger than or equal to (1), the interest rate entered into the computer is (6).

B. If (4) is larger than (3), the interest rate entered into the computer is (6).

C. If (4) equals zero, the interest rate entered into the computer is (5).

D. If A, B, and C are not true, the interest rate is found using the following formulae:

7. Portion of investment financed with Industrial Development Bonds

   $\frac{(4)}{(6)}$ _____ = (7) _____

8. Weighted Average Interest Rate

   (7) _____ * (6) _____ +

   1-(7) _____ * (5) _____ =

   _____ + _____ = (8) _____

The interest rate entered into the computer is (8).

SECTION III

USING THE COMPUTER PROGRAM

GAINING ACCESS TO THE SYSTEM

The computer program used to calculate the noncompliance penalty is written in the language FORTRAN. It is designed to operate on a time sharing computer only. The method used to access, or load, the program on a particular computer system will vary slightly from that on any other system. The following description of the accessing procedure should only be considered a general guide to time sharing and not as an exact procedure for any one system.

1. Switch on the terminal. The on/off switch is usually located on the keyboard, but some models have switches on the top or back of the terminal.

2. Contact the computer system. This can be done by one of two methods: an acoustic coupler or a so-called "hardwire" connection. The hardwire is easiest to use; it only requires pushing the "return" key on the keyboard. The computer will then respond with some indication that contact is established.

   If an acoustic coupler is used, the computer's telephone number must be dialed. When the system responds, a loud piercing sound is heard. At this time, the telephone receiver is placed in the coupler and the "return" key is pushed. The computer will respond as in the case of the hardwire.

3. Account and code number. At this time the computer will ask for an account number. This number is specific to the computer system and must be known beforehand. The number is entered by typing it on the keyboard and pressing the "return" key. The same procedure applies to the code number. After every entry, push "return."

4. **Obtaining access to the FORTRAN language.** Different computers have different ways of indicating that FORTRAN is to be used. The specific command will vary, but it is probably something like: USE 16K FORTRAN or LOAD 16K FORTRAN. The computer will then signal that the command is understood.

5. **Loading program.** The program must now be retrieved from its storage area within the computer and be loaded into the working area. The command that accomplishes this is PENALTY. The computer will respond with a message that the command is understood and that the program is ready to be used.

6. **Running the program.** The command RUN will start the program. From this point forward, the computer will ask specific questions. Each time a question is answered, the "return" key must be pushed.

Once the program PENALTY has been loaded into the computer, it is necessary to enter the data. The following section describes the data entry procedure.

ENTERING THE DATA

It is important in using a computer to understand that the computer requires a specific form of data entry. For example, if the item in question has the value of ten percent and the computer program is designed to accept a figure expressed in percentage terms, only the entry 10.0 is acceptable. Entries such as 10%, TEN, and .10 are all incorrect. The first two will result in an error message being typed at the terminal, followed by a command to re-enter the data. The third entry will be interpreted by the computer as 0.10 percent and used in the computation as that value. The result will be an incorrect figure for that penalty.

If a wrong number is entered and the return key has not been pushed, the mistake can be corrected by detecting the error and re-entering the number. The procedure for deleting a number before the return is pushed varies with the computer system. The deletion procedure should be checked before the program is run. If during data entry a wrong number is entered and the return key is pushed, operation of the program can be halted by pushing the Break key. The computer will respond by printing STOP and some system accounting data. To start the program again, type RUN.

The following paragraphs discuss general rules to be followed in entering data into the computer program. Exhibit II-1 contains an example of the completed entry for the Fertilizer Company. Figures which are underlined have been entered by the program user. After each line is entered the carriage return should be pressed. It should also be noted that each question asked by the computer must be answered. Thus, for example, if a firm has no debt and the interest rate is inapplicable, a zero must be entered for the interest rate. Certain questions asked by the computer refer to special types of analysis such as post-compliance settlements, limited life facilities and industrial development bonds. These special cases are discussed in later sections.

1. **Post-Compliance Settlement.** This number is entered only as a 0 or 1. For the Fertilizer Company this is an initial calculation and a 0 is entered.

2. **Limited Life Facility.** This number is entered as 0 or 1. For the Fertilizer Company this is not a limited life facility and a 0 is entered.

3. **Percent Financed by Industrial Development Bonds.** This is entered as a percent. For the Fertilizer Company, a 0 is entered.

EXHIBIT III-1
ENTERING DATA

```
1. IS THIS AN INITIAL PENALTY CALCULATION
   OR A POST-COMPLIANCE SETTLEMENT CALCULATION?
   0=INITIAL, 1=POST-COMPLIANCE:
?
0
2. IS THIS A LIMITED LIFE FACILITY? 1=YES 0=NO
?
0
3. PERCENTAGE FINANCED BY INDUSTRIAL DEVELOPMENT BONDS=
?
0
4. MONTHS OUT OF COMPLIANCE=
?
9
HOW MANY MONTHS HAVE PRECOMPLIANCE CAPITAL OR
PRECOMPLIANCE O&M EXPENDITURES?
?
5
FOR EACH MONTH OF PRECOMPLIANCE CAPITAL OR O&M
ENTER THE NUMBER OF THE MONTH,THE CAPITAL EXPENDITURE
AND THE O&M EXPENSE SEPARATED BY COMMAS.

MONTH,CAPITAL,O&M
?
2,166666.67,0
?
4,166666.67,0
?
7,0,100.00
?
8,0,1050.00
?
9,166666.67,740.00
5. INITIAL MONTHLY O & M EXPENSE=
?
1250.00
6. INVESTMENT TAX CREDIT RATE=
?
10.0
7. INCOME TAX RATE=
?
49.73
8. FORECAST INFLATION RATE=
?
7.2
9. DISCOUNT RATE=
?
15.91
```


EXHIBIT III-1
ENTERING DATA
(continued)

```
10. INTEREST RATE=
?
9.75
11. PREFERRED STOCK DIVIDEND RATE=
?
9.60
12. EQUITY SHARE OF INVESTMENT=
?
67.5
13. PREFERRED STOCK SHARE=
?
3.5
14. DEBT SHARE OF INVESTMENT=
?
29.0
15. DEPRECIATION LIFE=
?
9
16. USEFUL LIFE=
?
11
17. HOW MANY MONTHS AFTER THE FIRST DAY OF
    NONCOMPLIANCE WILL THE INITIAL PENALTY
    PAYMENT BE MADE?
?
0
18. DO YOU WISH TO SEE A LUMP SUM
    SETTLEMENT? 1=YES,0=NO:
?
1
19. HOW MANY MONTHS AFTER THE FIRST DAY OF
    NONCOMPLIANCE WILL THE LUMP SUM
    SETTLEMENT BE MADE?
?
0
```

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Number of Months Out of Compliance. This number is entered only as an integer. Fractions or decimals are not allowed. For the Fertilizer Company, compliance will be achieved in nine months. This is entered as 9.

Schedule of Precompliance Capital and Precompliance Operating and Maintenance Expenditures. The program will then ask for the number of months the firm will make precompliance capital or operating and maintenance expenditures. For the Fertilizer Company, the firm will make precompliance capital expenditures in months 2, 4, and 9. Precompliance operating and maintenance expenditures will be made in months 7, 8, and 9. Thus there are five months in which either precompliance capital or operating and maintenance expenditures are made (months 2, 4, 7, 8, and 9).

If no precompliance capital expenditures are to be made, the entire capital expenditure is entered in the last month of the noncompliance period. If the Fertilizer Company made no precompliance capital expenditures, the entire $500,000 would be entered in month 9.

The program will then ask for the number of the month, the capital expenditure and the operating and maintenance expenditure separated by commas for each month with precompliance capital or operating and maintenance expenditures. For months which have precompliance capital expenditures but no operating and maintenance expenditure, a zero must be entered for the operating and maintenance expenditure. Similarly, if the firm makes a precompliance operating and maintenance expenditure but no capital expenditure in a month, a zero must be entered for the capital expenditure. All dollar values are entered without dollar signs. The number of cents, however, should be entered following a decimal point.

For the Fertilizer Company, the schedule of precompliance capital and operating and maintenance expenditures is:

Month	Capital Expenditure	Operating and Maintenance Expenditure
2	166,666.67	0
4	166,666.67	0
7	0	100.00
8	0	1,050.00
9	166,666.67	740.00

5. **Initial Monthly O&M Expense.** The initial monthly operating and maintenance expense is the expense which would be incurred if the equipment were installed and operating. For the Fertilizer Company, the initial monthly operating and maintenance expense is $1,250.00.

6. **Investment Tax Rate.** This is entered as a percent and not as a decimal. Thus, for example, 7.5 percent would be entered as 7.5. The program is designed to test for data entered as a decimal and print an error message. In the Fertilizer Company example, the investment tax rate was 10.0 percent.

7. **Income Tax Rate.** This is also entered as a percent. For the Fertilizer Company the tax rate is 49.73 percent.

8. **Inflation Rate.** The inflation rate is entered as 7.2 percent.

9. **Discount Rate.** This is entered as a percent. The lower bound for any discount rate used is the rate of inflation. The program will not accept discount rates lower than the rate of inflation and will print message to that effect. If the discount rate entered is lower than the inflation rate, the program will set the discount rate equal to the inflation rate.

   For the Fertilizer Company, the discount rate is the higher of the twenty quarter average after-tax return on equity for the chemicals and allied products industry, or the twenty quarter average after-tax return on equity for all manufacturing corporations. This is calculated to be 15.91 percent.

10. **Interest Rate.** The interest rate is entered as a percent. For the Fertilizer Company this is the average return on "A" rated industrial bonds. The latest reported average is 9.75 percent.

11. Preferred Dividend Rates. This is entered as a percent. If the firm does not have preferred stock, both the dividend rate and the preferred share of the investment are entered as zero. For the Fertilizer Company this was the latest monthly average yield on "a" rated utility preferred stocks. It is entered as 9.60 percent.

12. Equity Share of Investment. This is entered as a percent. It was computed to be 67.5 percent for the Fertilizer Company.

13. Preferred Share of Investment. The preferred share of the investment is entered as a percent. For the Fertilizer Company this was computed at 3.5 percent.

14. Debt Share of Investment. This is entered as a percent. For the Fertilizer Company the debt share is 29.0 percent. If the sum of the preferred share, the debt share and the equity share of the investment is not equal to 100.0 percent, an error message is printed.

15. Depreciation Life in Years. This number must be entered as an integer. Decimals or fractions cannot be used. For the Fertilizer Company the depreciation life was nine (9) years.

16. Useful Life in Years. The useful life in years must also be entered as an integer. For the Fertilizer Company, the useful life is eleven (11) years.

17. Month of Initial Penalty Payment. The program asks "how many months after the first day of noncompliance will the initial penalty payment be made?" The Fertilizer Company paid the first quarterly penalty on the day the notice of noncompliance was issued. Therefore a zero (0) was entered into the computer in response to this question.

18. Lump Sum Settlement. The firm has the option to have the computer calculate a lump sum settlement. The Fertilizer Company selects this option by entering a 1.

19. Month of Lump Sum Settlement. The program requests the number of months from the first day of noncompliance the lump sum settlement will be made. The Fertilizer Company wants to see the value of the lump sum settlement as of the first day of noncompliance so a zero (0) is entered.

ERROR MESSAGES FOR DATA ENTRY

The program for computing the noncompliance penalty was designed to test for errors in the data as it is entered into the computer. If the program detects an error, a message is printed informing the user and requesting that the mistake be corrected. Examples of such error messages follow.

1. Equity, Debt and Preferred Share. The program will print an error message if the sum of the equity share, debt share, and the preferred share of the investment is not equal to 100 percent. This is illustrated in Exhibit III-2.[1]

2. Entering Data as a Decimal. An error message will be printed if the investment tax rate is entered as a decimal. This is illustrated in Exhibit III-3.

3. Inflation Rate Higher Than Discount Rate. The program will print message if the inflation rate is higher than the discount rate. For this type of error the program continues. If the user wishes to stop the program at this point, the break key should be pushed. If the user continues only the O&M portion of the penalty will be calculated and the discount rate will be set equal to the inflation rate. This is illustrated in Exhibit III-4 where the discount rate of 15.91 percent was erroneously entered as 5.91 percent.

[1] The computer program allows for some rounding errors and hence an error message is not printed if the sum of the debt, equity, and preferred stock shares is within one half of one percent of 100 percent. Thus the error message will be printed only if the sum exceeds 100.5 percent or is below 99.5 percent.

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EXHIBIT III-2

EQUITY DEBT AND PREFERRED SHARE OF INVESTMENT
GREATER THAN 100 PERCENT

```
    12. EQUITY SHARE OF INVESTMENT=
?
65.0
    13. PREFERRED STOCK SHARE=
?
3.5
    14. DEBT SHARE OF INVESTMENT=
?
29.0

    EQUITY+PREFERRED+DEBT NOT = 100, TRY AGAIN
    12. EQUITY SHARE OF INVESTMENT=
?
67.5
    13. PREFERRED STOCK SHARE=
?
3.5
    14. DEBT SHARE OF INVESTMENT=
?
29.0
```


EXHIBIT III-3

DATA ENTERED AS A DECIMAL AND THE WARNING MESSAGE

```
    6. INVESTMENT TAX CREDIT RATE=
?
0.10
    7. INCOME TAX RATE=
?
49.73
    8. FORECAST INFLATION RATE=
?
7.2
    9. DISCOUNT RATE=
?
15.91
    10. INTEREST RATE=
?
9.75
    11. PREFERRED STOCK DIVIDEND RATE=
?
9.60


    18. DO YOU WISH TO SEE A LUMP SUM
        SETTLEMENT? 1=YES,0=NO:
?
1
    19. HOW MANY MONTHS AFTER THE FIRST DAY OF
        NONCOMPLIANCE WILL THE LUMP SUM
        SETTLEMENT BE MADE?
?
0
    NOTE THAT AT LEAST ONE OF YOUR DATA ENTRIES
    HAS A PERCENTAGE VALUE OF LESS THAN ONE
```

EXHIBIT III-4

ENTERING INFLATION RATE
THAT IS HIGHER THAN DISCOUNT RATE

```
8. FORECAST INFLATION RATE=
?
7.2
9. DISCOUNT RATE=
?
5.91
DISCOUNT RATE NOT GREATER THAN INFLATION RATE.
ONLY THE O & M COMPONENT OF THE PENALTY WILL BE  CALCULATED.
THE DISCOUNT RATE IS SET EQUAL TO  THE INFLATION RATE.
```


OUTPUT FROM THE PROGRAM

The output from the computer program is structured in the following way.

- The amortization and depreciation method used in calculating the penalty is printed. For example, for the Fertilizer Company, rapid amortization and straight line depreciation are used.
- The program prints the quarterly penalty payments the firm must make during the period of noncompliance.
- If the option to compute a lump sum settlement if selected, the program prints the value of the lump sum settlement.
- The program asks if changes to the input data are desired.

An example of the output for the Fertilizer Company appears in Exhibit III-5.

The output printed in Exhibit III-5 illustrates only a few of the possible variations in penalty calculation possible with the computer program. The remainder of this section discusses in detail the output from the Fertilizer Company example and the program options available to alter that output.

EXHIBIT III-5
CALCULATION OF NONCOMPLIANCE PENALTY

STRAIGHT LINE= RAPID AMORTIZATION

MONTH	PAYMENT
1	5544.35
4	5641.56
7	5740.47

THE VALUE OF THE NONCOMPLIANCE PENALTY COMPUTED AS OF 0 MONTHS AFTER THE DATE OF NONCOMPLIANCE IS 16313.45

1. **Amortization and Depreciation Method.** The computer program calculates the capital investment portion of the penalty using standard and rapid amortization. Under both types of amortization the program calculates the depreciation tax savings using straight line, sum-of-the-years-digits and double-declining balance depreciation methods. The formulae for these calculations are contained in the Technical Support Document. The program automatically chooses the method which will result in the lowest penalty. This method is then used to calculate the penalty shown.

2. **Quarterly Penalty Payments.** Exhibit III-5 illustrated the payment made if the firm paid the first quarterly penalty on the day that the notice of noncompliance was issued. The first quarterly payment was $5,544.35. The second payment would be made ninety days later and it would equal the penalty shown for the fourth month $5,641.56. The final payment is in month seven and equals $5,740.47.

   A more realistic example might involve a three-month delay in the first payment. In this case, the output would appear as in Exhibit III-6. The first penalty payment includes the amounts that should have been paid at the first and fourth months, escalated forward to the time of actual payment. Such escalation is required to keep the present value of all penalties paid equal to the present value of savings from noncompliance. The next quarter penalty payment is due three months later, putting the firm back on the original penalty schedule. The present value of the payments in Exhibit III-6 is equal to the present value of the penalty payments in Exhibit III-5.

3. **Lump Sum Settlement.** A lump sum settlement is sometimes made instead of quarterly payments. For example, if the firm was going to be out of compliance for three quarters, it could either pay the three quarterly payments shown in the output or pay the lump sum settlement. In terms of present value, the amount eventually paid is the same in each case. Exhibit III-7 illustrates a six month delay in the lump sum settlement.

EXHIBIT III-6
THREE-MONTH DELAY IN PAYMENT OF PENALTY

17. HOW MANY MONTHS AFTER THE FIRST DAY OF NONCOMPLIANCE WILL THE INITIAL PENALTY PAYMENT BE MADE?

? 3

18. DO YOU WISH TO SEE A LUMP SUM SETTLEMENT? 1=YES,0=NO:

? 1

19. HOW MANY MONTHS AFTER THE FIRST DAY OF NONCOMPLIANCE WILL THE LUMP SUM SETTLEMENT BE MADE?

? 0

STRAIGHT LINE, RAPID AMORTIZATION

MONTH	PAYMENT
4	11394.37
7	5740.47

THE VALUE OF THE NONCOMPLIANCE PENALTY COMPUTED AS OF 0 MONTHS AFTER THE DATE OF NONCOMPLIANCE IS 16313.45

EXHIBIT III-7
SIX MONTH DELAY IN PAYMENT OF LUMP SUM SETTLEMENT

19. HOW MANY MONTHS AFTER THE FIRST DAY OF NONCOMPLIANCE WILL THE LUMP SUM SETTLEMENT BE MADE?

? 6

STRAIGHT LINE, RAPID AMORTIZATION

MONTH	PAYMENT
1	5544.35
4	5641.56
7	5740.47

THE VALUE OF THE NONCOMPLIANCE PENALTY COMPUTED AS OF 6 MONTHS AFTER THE DATE OF NONCOMPLIANCE IS 17563.25

Thus, for the Fertilizer Company, delaying the lump sum settlement six months increased the settlement to $17,563.25 from the $16,313.45 shown in Exhibit III-5. The $1,249.80 difference between the lump sum settlement delayed six months and the settlement paid on the date of noncompliance is the result of escalating the initial lump sum settlement forward to the time of actual payment.

Only a single payment is required if the first penalty payment is delayed longer than the firm is out of compliance. In this event, the firm will not make quarterly payments but will make one lump sum settlement. Exhibit III-8 shows the output from the program if a ten-month delay in penalty payment occurs. The Fertilizer Company was out of compliance nine months.

4. New Computation. The user has several options here. By typing in 0 (zero) and pushing the carriage return, the program can be terminated. Typing 999 will result in all of the data that is currently in the program being printed; the program will then once again ask if any changes are to be made. An example of typing 999 is shown in Exhibit III-9.

If changes are desired in the input, the following steps must be taken:

- The number of changes desired must be entered.
- For each change, the computer will respond with a question mark. When the question mark is printed, type in the number of the item that you wish to change. (For example, 4 for the marginal income tax rate.)
- The computer will print the name of the item. Enter the new data desired and push the carriage return.

EXHIBIT III-8
PENALTY PAYMENT WHEN DELAY
IS LONGER THAN NONCOMPLIANCE PERIOD

```
17. HOW MANY MONTHS AFTER THE FIRST DAY OF
    NONCOMPLIANCE WILL THE INITIAL PENALTY
    PAYMENT BE MADE?
?
10

STRAIGHT LINE, RAPID AMORTIZATION

     MONTH        PAYMENT
       11        18449.21
```

EXHIBIT III-9
PRINTING DATA THAT HAS BEEN ENTERED IN PROGRAM

```
   HOW MANY VARIABLES DO YOU WISH TO CHANGE ?
?
999
    1. IS THIS AN INITIAL PENALTY CALCULATION
       OR A POST-COMPLIANCE SETTLEMENT CALCULATION?
       0=INITIAL, 1=POST-COMPLIANCE:   0
    2. IS THIS A LIMITED LIFE FACILITY? 1=YES 0=NO   0
    3. PERCENTAGE FINANCED BY INDUSTRIAL DEVELOPMENT BONDS=  0.0
    4. MONTHS OUT OF COMPLIANCE=   9
       PRECOMPLIANCE EXPENDITURES
         MONTH       CAPITAL          O & M
           2       166666.67          0.0
           4       166666.67          0.0
           7           0.0          100.00
           8           0.0         1050.00
           9       166666.67         740.00
    5. INITIAL MONTHLY O & M EXPENSE=   1250.00
    6. INVESTMENT TAX CREDIT RATE= 10.00
    7. INCOME TAX RATE= 49.73
    8. FORECAST INFLATION RATE=  7.20
    9. DISCOUNT RATE= 15.91
   10. INTEREST RATE=  9.75
   11. PREFERRED STOCK DIVIDEND RATE=  9.60
   12. EQUITY SHARE OF INVESTMENT= 67.50
   13. PREFERRED STOCK SHARE=  3.50
   14. DEBT SHARE OF INVESTMENT= 29.00
   15. DEPRECIATION LIFE=   9
   16. USEFUL LIFE=  11
   17. HOW MANY MONTHS AFTER THE FIRST DAY OF
       NONCOMPLIANCE WILL THE INITIAL PENALTY
       PAYMENT BE MADE?   0
   18. DO YOU WISH TO SEE A LUMP SUM
       SETTLEMENT? 1=YES,0=NO:  1.
   19. HOW MANY MONTHS AFTER THE FIRST DAY OF
       NONCOMPLIANCE WILL THE LUMP SUM
       SETTLEMENT BE MADE?   0
  HOW MANY VARIABLES DO YOU WISH TO CHANGE ?
?
0
```


EXHIBIT III-10
ALTERING DATA IN THE PROGRAM

```
   HOW MANY VARIABLES DO YOU WISH TO CHANGE ?
?
3
ENTER A LIST OF VARIABLES TO BE CHANGED
SEPARATED BY COMMAS.
?
10,13,14
    10. INTEREST RATE=
?
9.75
    13. PREFERRED STOCK SHARE=
?
10.0
    14. DEBT SHARE OF INVESTMENT=
?
22.5
```

CALCULATION OF THE POST-COMPLIANCE SETTLEMENT

The post-compliance settlement adjusts the penalty payment to reflect the firm's actual capital and operating expenditures rather than the estimates used in the original penalty calculation. More current estimates of the inflation rate, the discount rate, and the capital structure of the firm are also used. For this purpose, ten types of data are needed:

- A schedule of actual capital expenditures made by the firm in reaching compliance.
- A schedule of actual operating and maintenance expenditures made by the firm prior to compliance.
- A new estimate of post-compliance monthly operating and maintenance expense based on the firm's experience and any additional information which becomes available prior to the post-compliance settlement.
- The compound annual inflation rate over the most recent sixty months.
- The discount rate averaged over the most recent twenty quarters.
- The average equity, preferred stock, and debt share of the capital structure over the most recent five years.
- The number of months between the day of compliance and date of post-compliance settlement.
- A post-compliance settlement interest rate chosen by the Department of Treasury for overpayments.
- A listing of the actual penalty payments made by the firm and the months in which they were made.
- The actual portion of the investment financed with industrial development bonds.[1]

[1] If this portion differs from the original estimate, the interest rate must be adjusted as discussed below.

In addition to these new data, it will be necessary to have available the remaining financial parameters originally used to calculate the noncompliance penalty for the firm. To continue the example of the hypothetical Fertilizer Company, Exhibit IV-1 contains the data originally used to calculate the noncompliance penalty.

PREPARING NEW DATA FOR ENTRY INTO THE PROGRAM

In order to calculate the post-compliance settlement, the computer program should be accessed in the manner described on pages III-1 to III-3. After the RUN command has been typed, the terminal will ask if the penalty calculation is for a post-compliance settlement. The computer program will then ask for the data requested in the initial penalty calculation. These data should be entered in the following manner.

1. Limited Life Facility. The same response as entered in the initial calculation should be entered. For the Fertilizer Company this value is zero (0).
2. Industrial Development Bonds. The actual percentage of the investment financed with industrial development bonds should be entered. For the Fertilizer Company this percentage is zero (0).
3. Months Out of Compliance. The actual number of months the firm is out of compliance should be entered. The Fertilizer Company was actually out of compliance nine (9) months.
4. Months With Precompliance Expenditures. The actual number of months with precompliance capital or operating and maintenance expenditures should be entered. The Fertilizer Company made precompliance expenditures in three (3) months.

EXHIBIT IV-1

FERTILIZER COMPANY
JULY 1979

DATA USED FOR ORIGINAL NONCOMPLIANCE PENALTY CALCULATIONS[1]

1. IS THIS AN INITIAL PENALTY CALCULATION OR A POST-COMPLIANCE SETTLEMENT CALCULATION? 0=INITIAL, 1=POST-COMPLIANCE: 0
2. IS THIS A LIMITED LIFE FACILITY? 1=YES 0=NO 0
3. PERCENTAGE FINANCED BY INDUSTRIAL DEVELOPMENT BONDS= 0.0
4. MONTHS OUT OF COMPLIANCE= 9
   PRECOMPLIANCE EXPENDITURES

MONTH	CAPITAL	O & M
2	166666.67	0.0
4	166666.67	0.0
7	0.0	100.00
8	0.0	1050.00
9	166666.67	740.00

5. INITIAL MONTHLY O & M EXPENSE= 1250.00
6. INVESTMENT TAX CREDIT RATE= 10.00
7. INCOME TAX RATE= 49.73
8. FORECAST INFLATION RATE= 7.20
9. DISCOUNT RATE= 15.91
10. INTEREST RATE= 9.75
11. PREFERRED STOCK DIVIDEND RATE= 7.60
12. EQUITY SHARE OF INVESTMENT= 67.50
13. PREFERRED STOCK SHARE= 3.50
14. DEBT SHARE OF INVESTMENT= 29.00
15. DEPRECIATION LIFE= 9
16. USEFUL LIFE= 11
17. HOW MANY MONTHS AFTER THE FIRST DAY OF NONCOMPLIANCE WILL THE INITIAL PENALTY PAYMENT BE MADE? 0
18. DO YOU WISH TO SEE A LUMP SUM SETTLEMENT? 1=YES,0=NO: 1.
19. HOW MANY MONTHS AFTER THE FIRST DAY OF NONCOMPLIANCE WILL THE LUMP SUM SETTLEMENT BE MADE? 0

[1] Listed during original penalty calculation by typing 999 when changes in input data were requested.

5. Schedule of Precompliance Expenditures. The actual precompliance expenditures should be entered. Exhibits IV-2 and IV-3 present the actual precompliance capital and operating and maintenance expenditures, respectively, made by the Fertilizer Company. These expenditures were:

Month	Capital Expenditure	Operating & Maintenance Expenditure
7	$184,050.00	$ 0.00
8	184,050.00	879.96
9	184,050.00	1,324.40

6. Initial Monthly O&M Expense. An estimate of the average monthly operating and maintenance expense which will be incurred over the first year of operating the pollution control equipment should be entered. This can be the estimate used in the initial calculation or, if better information is available, an updated estimate based on this better information. Exhibit IV-4 illustrates the new estimate of monthly operating and maintenance expense for the Fertilizer Company. The new estimate is $1,333.33.

7. Investment Tax Credit Rate. This should be the actual investment tax credit as a percent of the initial investment. In the case of the Fertilizer Company this will be line (7) of Exhibit IV-2 divided by line (10) of Exhibit IV-2 multiplied by the statutory rate of 10 percent. This will be 10 percent since the entire investment qualifies for the full investment tax credit.

8. Income Tax Rate. The income tax rate used in the initial calculation should be entered. For the Fertilizer Company this rate is 49.73 percent.

9. Inflation Rate. The most recent five year average inflation as recorded by the Chemical Engineering plant cost index should be entered. In the Fertilizer Company example, this is 7.0 percent.

10. Discount Rate. The most recent five year average of the discount rate should be calculated using the data source which was used in the initial calculation. For the Fertilizer Company the discount rate is 15.62 percent.

EXHIBIT IV-2

FERTILIZER COMPANY
CALCULATION OF ACTUAL CAPITAL EXPENDITURE
June 1, 1980

1.	List price or estimated price of the equipment =	$536,588.92
2.	Less: Discount from manufacturer =	(10,731.78)
3.	Equals net price of equipment =	525,857.14
4.	Plus: Sales tax on equipment[1] =	26,292.86
5.	Plus: Freight and delivery charge =	0
6.	Plus: Installation charge =	0
7.	Equals estimated cost of equipment installed =	$552,150.00
8.	Plus: Value of lost production =	0
9.	Plus: Cost of building construction or modifications =	0
10.	Equals TOTAL CAPITAL EXPENDITURE =	$552,150.00

The capital expenditures were made in three equal monthly payments of $184,050.00 starting in the seventh month of noncompliance.

[1]Sales tax in this case was not subtracted from revenue in the year of purchase.

EXHIBIT IV-3

ACTUAL MONTHLY PRE-COMPLIANCE OPERATING AND MAINTENANCE EXPENSE

FERTILIZER COMPANY
June 1, 1980

PRE-COMPLIANCE OPERATING EXPENSE			
Months 1-9			$ 0
Month 10			
Labor (84 hrs @ $10)		$840.00	
Power (1200 kwh @ .0333 kwh)		39.96	
TOTAL			$ 879.96
Month 11			
Labor (110 hrs @ $10)		$1,100.00	
Power (6739 kwh @ .0333 kwh)		224.40	
TOTAL			$1,324.40

EXHIBIT IV-4

FERTILIZER COMPANY
OPERATING AND MAINTENANCE EXPENSE
June 1, 1980

1.	Annual Labor Expense	
	1072 Hours x $10.81 per hour =	$11,588.32
2.	Power Cost	
	89991.5 kwh x $.038 per kwh =	3,419.68
3.	Water Cost	
	_____ gallons x $_____ per gallon =	0
4.	Raw Materials and Supplies	
	1200 lbs. x $1.20 per lb. =	1,440.00
5.	Yearly Increase in Property Tax =	0
6.	Cost of Production Lost Due to Maintenance or Use of Equipment =	0
7.	Total Cost (1 + 2 + 3 + 4 + 5 + 6) =	16,448.00
8.	Less: Value of Byproducts	
	800 lbs. at $.56 per lb. =	(448.00)
9.	Annual Operating and Maintenance (7-8) =	$16,000.00
10.	Average Monthly Operating and Maintenance (9÷12) =	1,333.33

11. Interest Rate. The interest rate used in the initial calculation should be entered unless the amount of industrial development bonds sold differs from the estimated amount used in the initial penalty calculation. If the amount of industrial development bonds sold differs from the estimated amount, the interest rate must be altered to reflect this.

    To re-estimate the interest rate, the total capital expenditure and the dollar value of issued industrial development bonds should be updated on Worksheet D, and the interest rate should be recalculated. (See Worksheet D, lines 1 and 3.) The interest rates on corporate bonds and industrial development bonds entered on the worksheet should not be updated.

    For the Fertilizer Company, the interest rate used in the initial calculation, 9.75 percent, is entered.

12. Preferred Stock Dividend Rate. The rate used in the initial calculation should be entered. For the Fertilizer Company, the preferred stock dividend rate is 9.60 percent.

13. Equity Share, Debt Share, and Preferred Stock Share of the Investment. The equity, debt, and preferred stock share should be calculated as illustrated in Section II using the most recent five years of annual statements. The Fertilizer Company's five year average equity share, preferred stock share, and debt share are 67.5 percent, 3.5 percent, and 29.0 percent, respectively.

14. Depreciation Life. The depreciation life used in the initial calculation should be entered. This is nine (9) years for the Fertilizer Company.

15. Useful Life. The useful life used in the initial calculation should be entered. This is eleven (11) years for the Fertilizer Company.

After these data are provided, the computer program will ask for data on the actual penalty payments made by the firm and the month in which each payment was made. The data are entered in the following manner.

[2334] Federal Register / Vol. 45, No. 146 / Monday, July 28, 1980 / Rules and Regulations

1. Number of Penalty Payments Made by the Firm. This is the actual number of payments made by the firm. If more than one payment is made in a month, they should be totaled and counted as one payment.

2. Month of Penalty Payment. This is the number of the month in which the penalty payment is received by EPA, beginning with the month the firm is out of compliance. For example, a firm making a payment at the time notice of noncompliance is issued would enter a one. If a six-month delay in payment occurred, a seven would be entered.

3. Actual Penalty Payment. This is the dollar amount of the penalty actually paid by the firm in each month. The payment entered should not include any of the penalty for late payment. The data entered in the Fertilizer Company example are identical to the penalties calculated in the last section and shown in Exhibit III-5. They are:

Month	Penalty Payment
1	$5,544.35
4	5,641.56
7	5,740.47

The program now asks for the Treasury interest rate to be used in the calculation of the interest on overpayments[1] and the number of months from compliance until settlement. These data are entered in the following manner.

1. Treasury Interest Rate. This is an annual interest rate set by the Secretary of the Treasury for the calculation of interest on overpayments. It is entered as a percent. For the Fertilizer Company, the rate chosen was 9.25 percent.

2. Months From Compliance to Settlement. The firm should enter the number of months from the date it comes into compliance to the date of the post-compliance settlement. In the example, the post-compliance settlement was made 2 months after the Fertilizer Company came into compliance.

[1]The Treasury has determined that the interest rate used to calculate the interest owed on underpayments will be the discount rate which has already been entered into the computer.

Exhibit IV-5 illustrates all the input for the post-compliance settlement for the Fertilizer Company.

OUTPUT FROM THE POST-COMPLIANCE SETTLEMENT CALCULATION

The output from the post-compliance settlement calculation incorporates the data on penalty payments made by the firm and compares these payments to a penalty schedule based on actual expenditures made to achieve compliance. The output consists of two parts:

- Printing of the penalty paid in each month and the penalty determined from actual expenditures. The difference between the actual penalty and the payment made by the firm is calculated in each month.
- The settlement due EPA or due to the firm is calculated.

The output from the post-compliance settlement for the Fertilizer Company is shown in Exhibit IV-6. The first column prints the month in which a penalty payment was made or a penalty payment was required based on the post-compliance penalty calculation. The second column contains the actual payment made by the firm. The third column is the penalty based on actual expenditures made by the firm coming into compliance.

The program next calculates the difference between the penalty payment in each month and the new penalty calculation based on actual expenditures. The difference between the payment made and the actual penalty is then charged interest at the rate specified by the Treasury for overpayments if the penalty paid exceeds the actual penalty or at the discount rate if the penalty paid is less than the actual penalty.[1]

[1]The method for calculating the interest on the amount of overpayment or underpayment is described in detail in Section V of the Technical Support Document

EXHIBIT IV-5
INPUT FOR CALCULATION OF POST-COMPLIANCE SETTLEMENT

```
   1. IS THIS AN INITIAL PENALTY CALCULATION
      OR A POST-COMPLIANCE SETTLEMENT CALCULATION?
      0=INITIAL, 1=POST-COMPLIANCE:
?
1
   ITEMS 4 AND 5 SHOULD SHOW AMOUNTS ACTUALLY
   EXPENDED
    2. IS THIS A LIMITED LIFE FACILITY? 1=YES 0=NO
?
0
    3. PERCENTAGE FINANCED BY INDUSTRIAL DEVELOPMENT BONDS=
?
0
    4. MONTHS OUT OF COMPLIANCE=
?
9
   HOW MANY MONTHS HAVE PRECOMPLIANCE CAPITAL OR
   PRECOMPLIANCE O&M EXPENDITURES?
?
3
   FOR EACH MONTH OF PRECOMPLIANCE CAPITAL OR O&M
   ENTER THE NUMBER OF THE MONTH,THE CAPITAL EXPENDITURE
   AND THE O&M EXPENSE SEPARATED BY COMMAS.

   MONTH,CAPITAL,O&M
?
7,184050.00,0
?
8,184050.00,879.96
?
9,184050.00,1324.40
    5. INITIAL MONTHLY O & M EXPENSE=
?
1333.33
    6. INVESTMENT TAX CREDIT RATE=
?
10.0
    7. INCOME TAX RATE=
?
49.73
    8. FORECAST INFLATION RATE=
?
7.0
    9. DISCOUNT RATE=
?
15.62
   10. INTEREST RATE=
?
9.75
```


EXHIBIT IV-5
INPUT FOR CALCULATION OF POST-COMPLIANCE SETTLEMENT
(continued)

```
   11. PREFERRED STOCK DIVIDEND RATE=
?
9.60
   12. EQUITY SHARE OF INVESTMENT=
?
67.5
   13. PREFERRED STOCK SHARE=
?
3.5
   14. DEBT SHARE OF INVESTMENT=
?
29.0
   15. DEPRECIATION LIFE=
?
9
   16. USEFUL LIFE=
?
11
   20. HOW MANY PENALTY PAYMENTS WERE MADE?
?
3
   20. PAYMENT NUMBER  1: ENTER MONTH,AMOUNT
?
1,5544.35
   20. PAYMENT NUMBER  2: ENTER MONTH,AMOUNT
?
4,5641.56
   20. PAYMENT NUMBER  3: ENTER MONTH,AMOUNT
?
7,5740.47
   21. TREASURY INTEREST RATE=
?
9.25

   22. MONTHS FROM COMPLIANCE UNTIL SETTLEMENT=
?
2
```

EXHIBIT IV-6
THE POST-COMPLIANCE SETTLEMENT

STRAIGHT LINE, RAPID AMORTIZATION

MONTH	PAID	PENALTY	DUE EPA	DUE FIRM
1	5544.35	8616.09	3071.74	0.0
4	5641.56	8763.06	3121.50	0.0
7	5740.47	8912.55	3172.08	0.0

SETTLEMENT DUE EPA= 10317.30

The post-compliance settlement was calculated and paid two months after the Fertilizer Company came into compliance. The total post-compliance settlement paid by the firm to EPA is $10,317.30.

SECTION V

SPECIAL CONDITIONS

The preceding four sections enable the user to calculate the noncompliance penalty and post-compliance settlement when the source is privately-owned and when compliance is achieved by modification of existing plant and equipment. In addition, it is assumed that financing would not involve industrial development bonds. Section V will expand the number of cases in which the penalty program is applicable and enable the user to compute the noncompliance penalty in the following situations.

- Plant and equipment necessary for compliance are financed through the sale of tax-exempt industrial development bonds.
- The source is operated by a local, state or federal government.
- The source has a limited useful life.

The noncompliance penalty in all three cases is calculated using the program PENALTY. However, it is necessary to modify some of the data entered into the program to reflect the unique characteristics of each of these situations. The following section describes special data requirements and modifications in data entry. It should be stressed that all data and data entry procedures discussed in the four previous sections are applicable to these special conditions except where specific changes are required.

INDUSTRIAL DEVELOPMENT BONDS

Industrial development bonds for pollution control equipment are used by firms in order to secure debt financing at an interest cost lower than the current rate on industrial bonds. This lower interest rate is possible because the development bonds are issued by a local or state government for the corporation and the interest payments received by the bondholder are exempt from federal income tax. The corporation pays the principal and interest payments, but because of the tax-exempt status of the interest, the interest charges are often a few percentage points below corporate debt of similar quality.

The Revenue Act of 1978 requires that firms financing with industrial development bonds receive only one-half of the investment tax credit when rapid amortization is used. For firms financing in part with development bonds, a pro-rata portion of this financing should be applied to the facility for determining the investment tax credit. The computer program will automatically pro-rate the investment tax credit. The user must provide two types of data.

- The percentage of the investment financed by industrial development bonds.
- The weighted average interest rate for the investment.[1]

Data are gathered for the calculation of the penalty in the same manner as described in Section II. In addition, the user must perform the following calculations.

[1] A worksheet is included in Section II (Worksheet D) to aid in calculating the weighted average interest rate.

1. **Percent financed with industrial development bonds.** This percentage is obtained by dividing the total issue of tax-exempt pollution control industrial development bonds by the capital investment. In the Fertilizer Company example, the estimated capital investment was $500,000. If the firm sold $200,000 in industrial development bonds, the percentage entered would be forty. This would be entered as 40.0. If the percentage exceeds one hundred, 100.0 should be entered.[1]

2. **Interest rate on industrial development bonds.** The interest rate used for pollution control industrial development bonds is published by Smith, Barney, Harris, Upham & Co., in the Bond Markets Review. The review is published weekly and the current yield on bonds is printed on the last page. The most recent yield published will be the interest rate used for industrial development bonds.

There are thus only two changes in the data entered for industrial development bonds. A percentage of the project financed with tax-exempt bonds is entered, and the interest rate used is the weighted average calculated using Worksheet D of Section II. All other data entry remains the same.

[1]The firm may issue bonds in a volume much higher than the capital investment. In this case financing is entered as 100 percent. The program will not accept data higher than 100 percent.

GOVERNMENT-OWNED FACILITIES

The use of the noncompliance penalty program for government facilities requires that all cash flows related to taxes be eliminated. In addition, the discount rate for all cash flows is entered at ten percent. Exhibit V-1 shows the data entry procedure for noncomplying sources owned by governments. Data labeled "no change" are calculated using the methods described in Section II.

FACILITIES WITH LIMITED USEFUL LIVES

The noncompliance penalty computer program will calculate penalties for facilities with limited useful lives. In cases where a noncomplying facility is to be operated for a period of time and then retired, the current program may be used. Capital and operating and maintenance cost estimates are made based on what it would cost to bring the source into compliance and the calculation proceeds in the normal manner. In such cases there are no precompliance operating and maintenance expenditures and the total capital expenditure is entered in the last month. There is no post-compliance settlement.

In cases where the noncomplying source is to be replaced by a new, complying facility after some period of noncompliance, program inputs and operation will be slightly different than at present. In such cases the program will:

- Ask if the calculation is for a limited life facility that is being replaced,
- Request an estimate of the capital and annual operating expenses required to bring the old source into compliance,

EXHIBIT V-1

DATA ENTRY FOR GOVERNMENT FACILITIES

DATA CATEGORY	PROGRAM ENTRY
Precompliance Capital Expenditures	No Change
Precompliance Operating and Maintenance	No Change
Initial Monthly Operating and Maintenance	No Change
Investment Tax Credit	0
Income Tax Rate	0
Inflation Rate	No Change
Discount Rate	10.0
Interest Rate	0
Preferred Dividend Rate	0
Equity Share of the Investment	100.0
Preferred Share of Investment	0
Debt Share of Investment	0
Depreciation Life in Years	No Change
Useful Life in Years	No Change

- Request a schedule of precompliance total capital expenditures (for productive capability plus pollution control equipment) required to build the new source,
- Request a schedule of precompliance O&M expenditures (for productive capability and pollution control equipment) associated with the new source, and
- Request an estimate of monthly production costs including pollution control operating and maintenance expenses at the new source.

The program will then calculate the penalty based on the costs of compliance at the old source but will be adjusted for precompliance expenditures at the new source. Once the new source is in operation and the old source is retired (and, thus, full compliance is achieved), a post-compliance settlement can be made. Such a settlement will consider changes in the compliance expenditures associated with the new source relative to the estimates made when the initial penalty calculation was carried out and updates of the monthly production costs, the inflation rate, the discount rate, and the capital structure of the firm.

APPENDIX C - COMPUTER PROGRAM

Note:

After Administration Docket EN79-1 was closed, a technical error was found in the computer program contained in Appendix C. The effect of the error was that the computer program did not conform to the Technical Support Document's (Appendix A) provisions for computing the investment tax credit when a source uses industrial development bonds and rapid amortization. A corrected Appendix C has been placed in the docket. Appendix C as it appears below contains the corrected program.

```
C                                                                       00000100
C       THIS PROGRAM COMPUTES THE NONCOMPLIANCE PENALTY                 00000200
C       PRESCRIBED IN SECTION 120 OF THE CLEAN AIR ACT.                 00000300
C                                                                       00000400
C       IT WAS WRITTEN BY ICS MANAGEMENT GROUP, INC.,                   00000500
C       NASHVILLE, TENNESSEE, UNDER CONTRACT WITH THE                   00000600
C       UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.                  00000700
C                                                                       00000900
C       THE PROGRAM FOLLOWS CLOSELY THE TECHNICAL SUPPORT               00001000
C       DOCUMENT DESCRIPTION OF THE CALCULATION OF                      00001100
C       SECTION 120 NONCOMPLIANCE PENALTIES.                            00001200
C                                                                       00001300
C                                                                       00001400
C                                                                       00001500
C VARIABLE DICTIONARY                                                   00001600
C                                                                       00001700
C   VECTORS                                                             00001800
C       AC(J)           ADJUSTED CAPITAL COMPONENT IN MONTH J           00001900
C       AO(J)           ADJUSTED O & M COMPONENT IN MONTH J             00002000
C       BOOK(J)         REMAINING BOOK VALUE IN MONTH J                 00002050
C       D(K,J)          DEPRECIATION FRACTION IN MONTH J, TYPE K        00002100
C       DEP(J)          DEPRECIATION TAX SAVINGS IN YEAR J              00002200
C       DELTA(J)        RECOMPUTED PENALTY LESS AMOUNT PAID             00002600
C       DEPCUM(J)       CUMULATIVE DEPRECIATION IN MONTH J              00002650
C       DIV(J)          PREFERRED STOCK DIVIDENDS PAID                  00002700
C                         AT END OF MONTH J                             00002800
C       INIT(J)         INITIAL INVESTMENT IN MONTH J                   00002859
C       INT(J)          INTEREST PAID AT END OF MONTH J                 00002900
C       MCF(J)          CASH FLOW IN MONTH J - ON TIME CASE             00003010
C       MCFP(J)         CASH FLOW IN MONTH J - DELAY CASE               00003020
C       MCR(J)          CAPITAL RELATED EXPENDITURES IN MONTH J         00003030
C       OM(J)           O & M EXPENSE AT END OF MONTH J                 00003040
C       P(J)            PENALTY PAYMENT DUE IN MONTH J                  00003100
C       PAID(J)         PENALTY ACTUALLY PAID IN MONTH J                00003200
C       PRIN(J)         PRINCIPAL REPAYMENT AT END OF                   00003300
C                         YEAR J                                        00003400
C       PRNOUT(J)       PRINCIPAL OUTSTANDING AT THE BEGINNING          00003500
C                         OF MONTH J                                    00003600
C       PRECAP(J)       PRE-COMPLIANCE CAP EXP IN MONTH J               00003700
C       PREF(J)         PREFERRED STOCK REDEEMED AT END OF              00003800
C                         MONTH J                                       00003900
C       PRFOUT(J)       PREFERRED STOCK OUTSTANDING AT BEGINNING        00004000
C                         OF MONTH J                                    00004100
C       PROM(J)         PRE-COMPLIANCE O & M EXP IN MONTH J             00004200
C       PVMCF(J)        PRESENT VALUE OF CASH FLOWS IN MONTH J          00004250
C       QUART(J)        QUARTERLY PENALTY DUE IN MONTH J                00004300
C       SC(J)           EQUIVALENT CAPITAL COMPONENT IN MONTH J         00004400
C       SO(J)           EQUIVALENT O & M COMPONENT IN MONTH J           00004500
C       X(J)            FRACTION OF CAPITAL SPENT PRIOR TO MONTH J      00004700
C       Y(J)            PRESENT VALUE OF O & M EXPENSE IN MONTH J       00004800
C       Z(J)            DELTA(J) ADJUSTED TO COMPLIANCE DATE            00004900
C                                                                       00005000
C   VARIABLES                                                           00005100
C       AM        ADJUSTED O & M PENALTY                                00005150
C       B         DEBT FRACTION OF CAPITAL STRUCTURE                    00005200
C       CUMDEP    FRACTION OF ASSET ALREADY DEPRECIATED                 00005300
C       DBTSHR    DEBT SHARE OF CAPITAL INVESTMENT ($)                  00005400
C       DD        MONTHS FROM COMPLIANCE DATE TO SETTLEMENT             00005500
C       DDIV      DUMMY INDICATING COSTS DIVIDED BY 1000                00005600
C       DLIM      DUMMY INDICATING LIMITED LIFE FACILITY                00005700
C       DLOOP     DUMMY INDICATING VARIABLES BEING CHANGED              00005800
```

```
C       DCUMP   DUMMY INDICATING A LUMP SUM SETTLEMENT                    00005900
C       DPOST   DUMMY INDICATING POST-COMPLIANCE SETTLEMENT              00006000
C       E       DISCOUNT RATE                                            00006100
C       E1      DISCOUNT RATE ON MONTHLY BASIS                           00006200
C       E4      DISCOUNT RATE ON A QUARTERLY BASIS                       00006300
C       EI      EQUITY SHARE OF CAPITAL INVESTMENT ($)                   00006400
C       F       PREFERRED STOCK FRACTION OF CAPITAL STRUCTURE            00006500
C       FIDB    FRACTION FINANCED BY INDUSTRIAL DEVELOPMENT BONDS        00006600
C       FRAPID  FRACTION OF DEPRECIATION SUBJECT TO RAPID                00006700
C                 AMORTIZATION                                           00006800
C       I       FORECAST INFLATION RATE                                  00006900
C       I1      INFLATION RATE ON MONTHLY BASIS                          00007000
C       I4      INFLATION RATE ON A QUARTERLY BASIS                      00007100
C       II      CAPITAL COST IN DOLLARS (INITIAL INVESTMENT)             00007200
C       IIOLD   CAPITAL COST FOR OLD FACILITY                            00007300
C       J       INDEX INDICATING THE YEAR                                00007400
C       K       INDEX INDICATING THE YEAR                                00007500
C       L       PERIOD OF DELAYED COMPLIANCE(MONTHS)                     00007600
C       LDPP    DELAY BEFORE INITIAL PENALTY PAYMENT (MONTHS)            00007700
C       LDTS    DUMMY INDICATING DEPRECIATION METHOD                     00007800
C       MOS     MONTHS DELAY IN SETTLEMENT                               00007900
C       MO      INITIAL MONTHLY O & M EXPENSE ($)                        00008000
C       MOOLD   O & M COST FOR OLD FACILITY                              00008100
C       NDEP    DEPRECIATION LIFE (YEARS)                                00008300
C       NLOOP   NUMBER OF VARIABLES TO BE CHANGED                        00008400
C       NPP     NUMBER OF PENALTY PAYMENTS ACTUALLY MADE                 00008500
C       NUSE    USEFUL LIFE (YEARS)                                      00008600
C       NVAR    VARIABLE NUMBER BEING CHANGED                            00008700
C       PVACR   PRESENT VALUE OF ANNUAL CAPITAL RELATED FLOWS            00008800
C       PVADJ   PRESENT VALUE OF CASH FLOWS ADJ FOR PRE-COMPL EXP        00008900
C       PVDLA   PRESENT VALUE OF DELAYED CASH FLOWS                      00009000
C       PVIN    PRESENT VALUE OF INITIAL CASH FLOWS                      00009100
C       PVOM    PRESENT VALUE OF O & M CASH FLOWS                        00009200
C       PVPCE   PRESENT VALUE OF CASH FLOWS IN ALL CYCLES                00009300
C       PVPEN   PRESENT VALUE OF PENALTY                                 00009400
C       PV1PCE  PRESENT VALUE OF CASH FLOWS IN FIRST CYCLE               00009500
C       Q       EQUITY FRACTION OF CAPITAL STRUCTURE                     00009600
C       R       INTEREST RATE FOR POST-COMPL SETTLEMENT                  00009700
C       RDIV    PREFERRED STOCK DIVIDEND RATE                            00009800
C       RDIV12          MONTHLY PREFERRED STOCK DIVIDEND RATE            00009850
C       RINT    INTEREST RATE ON DEBT                                    00009900
C       RINT12          MONTHLY INTEREST ON DEBT                         00009950
C       SAVING  PRESENT VALUE OF ECONOMIC SAVINGS OF DELAY               00010000
C       SETTLE  POST-COMPLIANCE SETTLEMENT AMOUNT                        00010100
C       TITC    INVESTMENT TAX CREDIT RATE(%)                            00010200
C       TTR     MARGINAL INCOME TAX RATE (%)                             00010300
C       ZDELAY  ZTOTAL ADJUSTED TO SETTLEMENT DATE                       00010400
C       ZTOTAL  SUM OF Z(J) ADJUSTED TO COMPLIANCE DATE                  00010500
C                                                                        00010600
C       OTHER VARIABLES BEGINNING WITH Z ARE USED TO CONVERT             00010700
C         FROM INTEGER TO REAL                                           00010800
C                                                                        00010900
C                                                                        00011000
C                                                                        00011100
C MAIN PROGRAM                                                           00011200
C                                                                        00011300
C                                                                        00011400
      IMPLICIT REAL*8(A-H,O-Z)                                           00011450
C                                                                        00011500
      DIMENSION U(6,144),DEP(360)                                        00011600
      DIMENSION PKIN(360),PKNOUT(360),PKEF(360)                          00011700
```

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      DIMENSION PREDUB(360),INT(360)                                    00011800
      DIMENSION DELTA(100),Z(100)                                       00011900
      DIMENSION DIV(360)                                                00012000
      DIMENSION X(360),PRECAP(360),PKUM(360),P(360)                     00012100
      DIMENSION SL(360),SU(360),AL(360),AU(360),PAID(360)               00012200
      DIMENSION PVDIS(6),QUART(360),Y(360)                              00012300
      DIMENSION BOOK(360),DEPCUM(360),INIT(360),MCF(360)                00012400
      DIMENSION MCK(360),MCFP(360),UM(360),PVMCF(360)                   00012425
C                                                                       00012500
C                                                                       00012600
      INTEGER DEPMET,DKAPID,DLOOP,DDIV,DLIM,DEL(23)                     00012800
      INTEGER DPRCAP,DPKUM,DPOST,DD,DATA                                00012900
      REAL II,I,IIC,II,MO,M12,M9                                        00013000
      REAL INT,M,I4,LUMP,MONEY,MOULD,IOULD                              00013100
      REAL E1,E4,M4,IACF,IACII,INIT,MCF,MCFP,MCK                        00013200
C                                                                       00013300
C                                                                       00013400
C   DATA INPUT                                                          00013500
C                                                                       00013600
C                                                                       00013700
  100 DLOOP=1                                                           00013800
      KW=6                                                              00013900
      KR=5                                                              00014000
   90 WRITE(KW,7400)                                                    00014100
      WRITE(KW,7401)                                                    00014200
      WRITE(KW,7402)                                                    00014300
 7400 FORMAT(5X,' 1. IS THIS AN INITIAL PENALTY CALCULATION')           00014400
 7401 FORMAT(9X, 'OR A POST-COMPLIANCE SETTLEMENT CALCULATION?')        00014500
 7402 FORMAT(9X,'0=INITIAL, 1=POST-COMPLIANCE:',I4)                     00014600
      READ(KR,*)DPOST                                                   00014700
      IF(DPOST)94,94,80                                                 00014800
   80 WRITE(KW,7410)                                                    00014900
      WRITE(KW,7411)                                                    00015000
 7410 FORMAT(5X,'ITEMS 4 AND 5 SHOULD SHOW AMOUNTS ACTUALLY')           00015100
 7411 FORMAT(5X, 'EXPENDED')                                            00015200
   94 GO TO(93,3000),DLOOP                                              00015300
C                                                                       00015400
   93 WRITE(KW,7422)                                                    00015500
 7422 FORMAT(5X,' 2. IS THIS A LIMITED LIFE FACILITY? 1=YES',           00015600
     E ' 0=NO',I4)                                                      00015700
      READ(KR,*)DLIM                                                    00015800
      IF(DLIM)96,96,95                                                  00015900
   95 WRITE(KW,7425)                                                    00016000
      WRITE(KW,7426)                                                    00016100
 7425 FORMAT(5X,'ITEMS 4 AND 5 SHOULD SHOW COSTS FOR THE')              00016200
 7426 FORMAT(5X,'REPLACEMENT FACILITY')                                 00016300
   96 GO TO(97,3000),DLOOP                                              00016400
C                                                                       00016500
   97 WRITE(KW,7535)                                                    00016600
 7535 FORMAT(5X,' 3. PERCENTAGE FINANCED BY INDUSTRIAL DEVELOP',        00016700
     C  'MENT BONDS=',F6.2)                                             00016800
      READ(KR,*)FIDB                                                    00016900
      FIDB=FIDB/100.                                                    00017000
      GO TO(101,3000),DLOOP                                             00017100
C                                                                       00017200
  101 DDIV=1                                                            00017400
      DATA=0                                                            00017500
      R=0.                                                              00017600
 8000 FORMAT(F20.5)                                                     00017700
 8001 FORMAT(I20)                                                       00017800
 8002 FORMAT(I5,5F10.2)                                                 00017900
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184.      6000    FORMAT(10X)                                                    00018000
185.       110    WRITE(KW,4005)                                                 00018100
186.      4005    FORMAT(5X,29H 4. MONTHS OUT OF COMPLIANCE=,I4)                 00018200
187.              READ(KK,*)L                                                    00018300
188.              DO 4003 J=1,L                                                  00018400
189.              PRECAP(J)=0.                                                   00018500
190.      4003    PROM(J)=0.                                                     00018600
191.              WRITE(KW,4010)                                                 00018700
192.              WRITE(KW,4011)                                                 00018800
193.      4010    FORMAT(5X,'HOW MANY MONTHS HAVE PRECOMPLIANCE CAPITAL OR')     00018900
194.      4011    FORMAT(5X,'PRECOMPLIANCE O&M EXPENDITURES?')                   00019000
195.              READ(KK,*)INUM                                                 00019100
196.              IF(INUM.LT.1)GO TO 200                                         00019150
197.              WRITE(KW,9001)                                                 00019200
198.      9001    FORMAT(5X,'FOR EACH MONTH OF PRECOMPLIANCE CAPITAL OR O&M'      00019300
199.         &    ,/,5X,'ENTER THE NUMBER OF THE MONTH,THE CAPITAL EXPEND',      00019400
200.         &    'ITURE',/,5X,'AND THE O&M EXPENSE SEPARATED BY COMMAS.')       00019500
201.              WRITE(KW,6000)                                                 00019600
202.              II=0.                                                          00019700
203.              WRITE(KW,4015)                                                 00019800
204.      4015    FORMAT(5X,'MONTH,CAPITAL,O&M')                                 00019900
205.              DO 133 J=1,INUM                                                00020000
206.              READ(KK,*)J1,X1,Y1                                             00020100
207.              PRECAP(J1)=X1                                                  00020200
208.       133    PROM(J1)=Y1                                                    00020300
209.       200    GO TO (210,3000),OLUUP                                         00020400
210.       210    WRITE(KW,4020)                                                 00020500
211.      4020    FORMAT(5X,34H 5. INITIAL MONTHLY O & M EXPENSE=,F10.2)         00020600
212.              READ (KK,*)MONEW                                               00020700
213.              GO TO (220,3000),OLUUP                                         00021100
214.       220    WRITE(KW,4030)                                                 00021700
215.      4030    FORMAT(5X,31H 6. INVESTMENT TAX CREDIT RATE=,F6.2)             00021800
216.              READ(KK,*)TITC                                                 00021900
217.              IF(TITC-1.)223,227,227                                         00022000
218.       223    IF(TITC)227,227,229                                            00022100
219.       229    DATA=1                                                         00022200
220.       227    TITC=TITC/100.                                                 00022300
221.              GO TO (230,3000),OLUUP                                         00022400
222.       230    WRITE(KW,4040)                                                 00022500
223.      4040    FORMAT(5X,20H 7. INCOME TAX RATE=,F6.2)                        00022600
224.              READ(KK,*)TTR                                                  00022700
225.              IF(TTR-1.)233,237,237                                          00022800
226.       233    IF(TTR)237,237,239                                             00022900
227.       239    DATA=1                                                         00023000
228.       237    TTR=TTR/100.                                                   00023100
229.              GO TO (240,3000),OLUUP                                         00023200
230.       240    WRITE(KW,4050)                                                 00023300
231.      4050    FORMAT(5X,28H 8. FORECAST INFLATION RATE=,F6.2)                00023400
232.              READ(KK,*)I                                                    00023500
233.              IF(I-1.)243,247,247                                            00023600
234.       243    IF(I)247,247,244                                               00023700
235.       244    DATA=1                                                         00023800
236.       247    I=I/100.                                                       00023900
237.              II=(1.+I)**(1./12.)-1.                                         00024000
238.              GO TO (250,3000),OLUUP                                         00024100
239.       250    WRITE(KW,4060)                                                 00024200
240.      4060    FORMAT(5X,18H 9. DISCOUNT RATE=,F6.2)                          00024300
241.              READ(KK,*)E                                                    00024400
242.              IF(E-1.)253,255,255                                            00024500
243.       253    IF(E)255,255,254                                               00024600
244.       254    DATA=1                                                         00024700
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                  E=E/100.                                                    00024800
      256         IF(E-1)258,258,259                                          00024900
      258         WRITE(KW,4065)                                              00025100
     4065         FORMAT(' DISCOUNT RATE NOT GREATER THAN INFLATION RATE.',   00025102
     &                 /,' ONLY THE O & M COMPONENT OF THE PENALTY WILL BE',  00025105
     &                 ' CALCULATED.',/,' THE DISCOUNT RATE IS SET EQUAL TO', 00025110
     &                 ' THE INFLATION RATE.')                                00025115
                  E=1                                                         00025300
      259         GO TO (260,3000),OLOOP                                      00025310
      260         WRITE(KW,4070)                                              00025400
     4070         FORMAT(5X,'ANNUAL INTEREST RATE=',F6.2)                     00025500
                  READ(KK,*)RINT                                              00025600
                  IF(RINT-1.)263,267,267                                      00025700
      263         IF(RINT)267,267,264                                         00025800
      264         DATA=1                                                      00025900
      267         RINT=RINT/100.                                              00026000
                  GO TO (270,3000),OLOOP                                      00026100
      270         WRITE(KW,4080)                                              00026200
     4080         FORMAT(5X,'PREFERRED STOCK DIVIDEND RATE=',F6.2)            00026300
                  READ(KK,*)RDIV                                              00026400
                  IF(RDIV-1.)273,277,277                                      00026500
      273         IF(RDIV)277,277,274                                         00026600
      274         DATA=1                                                      00026700
      277         RDIV=RDIV/100.                                              00026800
                  GO TO (300,3000),OLOOP                                      00026900
      300         WRITE(KW,4090)                                              00027000
     4090         FORMAT(5X,'EQUITY SHARE OF INVESTMENT=',F6.2)               00027100
                  READ(KK,*)Q                                                 00027200
                  IF(Q-1.)303,307,307                                         00027300
      303         IF(Q)307,307,304                                            00027400
      304         DATA=1                                                      00027500
      307         Q=Q/100                                                     00027600
                  GO TO (280,3000),OLOOP                                      00027700
      280         WRITE(KW,4100)                                              00027800
     4100         FORMAT(5X,'PREFERRED STOCK SHARE=',F6.2)                    00027900
                  READ(KK,*)F                                                 00028000
                  IF(F-1.)283,287,287                                         00028100
      283         IF(F)287,287,284                                            00028200
      284         DATA=1                                                      00028300
      287         F=F/100.                                                    00028400
                  GO TO (290,3000),OLOOP                                      00028500
      290         WRITE(KW,4110)                                              00028600
     4110         FORMAT(5X,'DEBT SHARE OF INVESTMENT=',F6.2)                 00028700
                  READ(KK,*)B                                                 00028800
                  IF(B-1.)313,317,317                                         00028900
      313         IF(B)317,317,314                                            00029000
      314         DATA=1                                                      00029100
      317         B=B/100.                                                    00029200
                  GO TO (324,3000),OLOOP                                      00029300
      324         IF(ABS(Q+F+B-1.)-.005)350,325,325                           00029400
      325         WRITE(KW,6000)                                              00029500
                  WRITE(KW,4500)                                              00029600
     4500         FORMAT(5X,'EQUITY+PREFERRED+DEBT NOT = 100, TRY AGAIN')     00029700
                  GO TO 300                                                   00029800
      350         WRITE(KW,4130)                                              00029900
     4130         FORMAT(5X,'DEPRECIATION LIFE=',I4)                          00030000
                  READ(KK,*)NDEP                                              00030100
                  GO TO (320,3000),OLOOP                                      00030200
      320         WRITE(KW,4140)                                              00030300
     4140         FORMAT(5X,'USEFUL LIFE=',I4)                                00030400
                  READ(KK,*)NUSE                                              00030500
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      IF(NUSE.GE.NDEP)GO TO 9991                                        00030505
      WRITE(6,9142)                                                     00030510
 9142 FORMAT(' ERROR:DEPRECIABLE LIFE CANNOT BE GREATER THAN',          00030515
     E       ' USEFUL LIFE.')                                           00030520
      GO TO 350                                                         00030525
 9991 GO TO (321,3000),OLOOP                                            00030600
  321 IF(OPOST)360,360,322                                              00030700
  360 WRITE(KW,7601)                                                    00030800
      WRITE(KW,7602)                                                    00030900
      WRITE(KW,7603)                                                    00031000
 7601 FORMAT(5X,'17. HOW MANY MONTHS AFTER THE FIRST DAY OF')           00031100
 7602 FORMAT(9X,'NONCOMPLIANCE WILL THE INITIAL PENALTY')               00031200
 7603 FORMAT(9X,'PAYMENT BE MADE?',I4)                                  00031300
      READ(KK,*)LOPP                                                    00031400
      GO TO(9040,3000),OLOOP                                            00031500
 9040 WRITE(KW,7560)                                                    00031600
      WRITE(KW,7561)                                                    00031700
 7560 FORMAT(5X,'18. DO YOU WISH TO SEE A LUMP SUM')                    00031800
 7561 FORMAT(9X,'SETTLEMENT? 1=YES,0=NO:',F4.0)                         00031900
      READ(KK,*)OLUMP                                                   00032000
      IF(OLUMP)367,367,6380                                             00032100
 6380 WRITE(KW,7575)                                                    00032500
      WRITE(KW,7576)                                                    00032600
      WRITE(KW,7577)                                                    00032700
 7575 FORMAT(5X,'19. HOW MANY MONTHS AFTER THE FIRST DAY OF')           00032800
 7576 FORMAT(9X,'NONCOMPLIANCE WILL THE LUMP SUM')                      00032900
 7577 FORMAT(9X,'SETTLEMENT BE MADE?',I4)                               00033000
      READ(KK,*)MOS                                                     00033100
      GO TO (367,3000),OLOOP                                            00033200
  322 WRITE(KW,9190)                                                    00033300
 9190 FORMAT(5X,'20. HOW MANY PENALTY PAYMENTS WERE MADE?',I4)          00033400
      READ(KK,*)NPP                                                     00033500
      DO 412 J=1,100                                                    00033600
  412 PAID(J)=0.                                                        00033700
      IF(NPP)416,416,411                                                00033800
  411 DO 415 J=1,NPP                                                    00033900
      WRITE(KW,7420)J                                                   00034000
 7420 FORMAT(9X,'20. PAYMENT NUMBER',I3,' ENTER MONTH,AMOUNT')          00034100
      READ(KK,*)N9,PYMT                                                 00034200
      IF(J-1)413,413,415                                                00034300
  413 LOPP=N9-1                                                         00034400
  415 PAID(N9)=PYMT                                                     00034500
  416 GO TO (417,3000),OLOOP                                            00034600
  417 WRITE(KW,7415)                                                    00034700
 7415 FORMAT(5X,'21. TREASURY INTEREST RATE=',F6.2)                     00034800
      READ(KK,*)R                                                       00034900
      IF(R-1.)403,407,407                                               00035000
  403 IF(R)407,407,404                                                  00035100
  404 DATA=1                                                            00035200
  407 R=R/100.                                                          00035300
      GO TO (9070,3000),OLOOP                                           00035400
 9070 WRITE(KW,6000)                                                    00035410
      WRITE(KW,7755)                                                    00035420
 7755 FORMAT(5X,'22. MONTHS FROM COMPLIANCE UNTIL SETTLEMENT=')         00035430
      READ(KK,*)DD                                                      00035440
      GO TO(367,3000),OLOOP                                             00035450
  367 IF(OLIM)420,420,365                                               00035500
  365 WRITE(KW,7440)                                                    00035600
      WRITE(KW,7441)                                                    00035700
 7440 FORMAT(5X,'23. CAPITAL COST WHICH WOULD HAVE ',                   00035800
     C   'BEEN INCURRED')                                              00035900
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367.      7491   FORMAT(5X,'    TO BRING EXISTING FACILITY INTO',                00036000
368.           C   ' COMPLIANCE',F10.2)                                          00036100
369.              READ(KR,*)IOLD                                                00036200
370.       375    GO TO (385,3000),OLOOP                                        00036300
371.       385    WRITE(KW,7497)                                                00036400
372.              WRITE(KW,7498)                                                00036500
373.      7497   FORMAT(5X,'24. MONTHLY O & M COST TO KEEP EXISTING FACILITY')  00036600
374.      7498   FORMAT(5X,'    IN COMPLIANCE=',F10.2)                          00036700
375.              READ(KR,*)MOOLD                                               00036800
376.       389    GO TO (920,3000),OLOOP                                        00036900
377.      C                                                                     00037000
378.      C                                                                     00037100
379.      C                                                                     00037200
380.      C       DATA CHECKS AND INITIALIZATIONS                               00037300
381.      C                                                                     00037400
382.      C                                                                     00037500
383.      C                                                                     00037600
384.      C       COMPUTE MONTHLY AND QUARTERLY EQUIVALENT VALUES OF            00037700
385.      C       E AND I FOR USE LATER IN THE PROGRAM.                         00037800
386.        920   E1=(1.+E)**(1./12.)-1.                                        00037900
387.              E4=(1.+E)**(.25)-1.                                           00038000
388.              I4=(1.+I)**(.25)-1.                                           00038100
389.              R1=(1.+R)**(1./12.)-1.                                        00038200
390.              RDIV12=(1.+RINT)**(1./12.)-1.                                 00038230
391.              RINT12=(1.+RINT)**(1./12.)-1.                                 00038260
392.      C                                                                     00038300
393.              IERR1=0                                                       00038310
394.              IERR2=0                                                       00038312
395.              IERR3=0                                                       00038314
396.              IF(DPOST.EQ.1.AND.NPP.EQ.0)IERR1=1                            00038320
397.              IF(DPOST.EQ.1.AND.R.EQ.0.)IERR2=1                             00038330
398.              IF(DLIM.NE.1)GO TO 6302                                       00038340
399.              IF(IOLD.EQ.0..AND.MOOLD.EQ.0.)IERR3=1                         00038350
400.       6302   IF(IERR1.EQ.1)WRITE(6,6303)                                   00038355
401.       6303   FORMAT(' ERROR: NO PENALTY PAYMENTS(VARIABLE #20)',           00038360
402.            E  /,' INPUT FOR A POST-COMPLIANCE SETTLEMENT.')                00038365
403.              IF(IERR2.EQ.1)WRITE(6,6304)                                   00038370
404.       6304   FORMAT(' ERROR: TREASURY INTEREST RATE(VARIABLE #21)',        00038375
405.            E  /,' IS ZERO IN A POST-COMPLIANCE SETTLEMENT.')               00038380
406.              IF(IERR3.EQ.1)WRITE(6,6305)                                   00038385
407.       6305   FORMAT(' ERROR: NO CAPITAL OR O & M COSTS(VARIABLES',         00038390
408.            &  '  23 & 24)',/,' TO BRING EXISTING FACILITY INTO ',         00038392
409.            E  'COMPLIANCE ON A LIMITED LIFE FACILITY.')                    00038394
410.              IERR=IERR1+IERR2+IERR3                                        00038396
411.              IF(IERR.GT.0)GO TO 7299                                       00038398
412.              MO=MONEW                                                      00038400
413.              IF(DABS(Q*P*B-1.)-.005)922,921,921                            00038500
414.       921    WRITE(KW,9500)                                                00038600
415.              GO TO 100                                                     00038700
416.       922    CONTINUE                                                      00038750
417.              II=0                                                          00039900
418.              DO 153 J=1,L                                                  00040000
419.       130    II=II+PRECAP(J)/(1.+II)**J                                    00040100
420.       153    CONTINUE                                                      00040200
421.       6059   X(1)=0.                                                       00040300
422.              IF(II)6060,6060,6070                                          00040400
423.       6060   DO 6065 K=1,L                                                 00040500
424.       6065   X(K)=1.                                                       00040600
425.              GO TO 154                                                     00040700
426.       6070   DO 6077 K=2,L                                                 00040800
427.       6076   X(K)=X(K-1)+PRECAP(K-1)/(1.+II)**(K-1)                        00040900
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428.      6077   CONTINUE                                                00041000
429.             DO 6078 K=1,L                                           00041100
430.      6078   X(K)=X(K)/11                                            00041200
431.             C                                                       00041300
432.             L                                                       00041400
433.       154   IF(DLIM)432,432,430                                     00041500
434.       430   II=IIOLD/(1.+II)**L                                     00041600
435.             MO=MOOLD                                                00041700
436.       432   CONTINUE                                                00041800
437.       440   IF(II-1000000.)445,450,450                              00041900
438.       445   IF(MO-100000.)475,450,450                               00042000
439.       450   II=II/1000.                                             00042100
440.             DDIV=2                                                  00042200
441.             MO=MO/1000.                                             00042300
442.             DO 460 J=1,L                                            00042400
443.             IF(DPOST)455,455,454                                    00042500
444.       454   PAID(J)=PAID(J)/1000.                                   00042600
445.       455   PRECAP(J)=PRECAP(J)/1000.                               00042700
446.       460   PROM(J)=PROM(J)/1000.                                   00042800
447.             WRITE(KW,6000)                                          00042900
448.             WRITE(KW,6000)                                          00043000
449.             WRITE(KW,4600)                                          00043100
450.      4600   FORMAT(5X,'NOTE THAT FIGURES BELOW ARE IN THOUSANDS')   00043200
451.       475   CONTINUE                                                00043300
452.             IF(DATA)457,457,453                                     00043400
453.       453   WRITE(KW,4570)                                          00043500
454.             WRITE(KW,4571)                                          00043600
455.      4570   FORMAT(5X,'NOTE THAT AT LEAST ONE OF YOUR DATA ENTRIES') 00043700
456.      4571   FORMAT(5X,'HAS A PERCENTAGE VALUE OF LESS THAN ONE')    00043800
457.             DATA=0                                                  00043900
458.       457   CONTINUE                                                00044000
459.             ZNDEP=NDEP                                              00044500
460.             DO 490 J=1,360                                          00044600
461.             AC(J)=0.                                                00044610
462.             AD(J)=0.                                                00044620
463.             DEP(J)=0.                                               00044700
464.             BOOK(J)=0.                                              00045000
465.             DEPCUM(J)=0.                                            00045100
466.             INIT(J)=0.                                              00045200
467.             PRIN(J)=0.                                              00045300
468.             PRNOUT(J)=0.                                            00045400
469.             PREF(J)=0.                                              00045500
470.             PRFOUT(J)=0.                                            00045600
471.             INT(J)=0.                                               00045700
472.             MCF(J)=0.                                               00045900
473.             DIV(J)=0.                                               00046000
474.             P(J)=0.                                                 00046200
475.             QUART(J)=0.                                             00046300
476.             MCR(J)=0.                                               00046310
477.             MCFP(J)=0.                                              00046320
478.             UM(J)=0.                                                00046330
479.             PVUMN=0.                                                00046332
480.             PVPROM=0.                                               00046334
481.       490   PVMCF(J)=0.                                             00046340
482.             DO 491 K=1,6                                            00046500
483.             PVDIS(K)=0.                                             00046600
484.             DO 491 J=1,144                                          00046700
485.       491   D(K,J)=0.                                               00046800
486.             DO 493 J=1,100                                          00046810
487.             DELTA(J)=0.                                             00046820
488.       493   Z(J)=0.                                                 00046830
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      C                                                                 00046900
      C                                                                 00047000
      C                                                                 00047400
  492     DO 495 J=1,L                                                  00047500
          PKECAP(J)=PKECAP(J)/(1.+II)**J                                00047600
  495     PKUM(J)=PKUM(J)/(1.+II)**J                                    00047700
          MO=MO/(1.+II)**L                                              00047800
          DO 196 J=1,L                                                  00047810
          Y(J)=PKUM(J)/((1.+E1)/(1.+II))**J                             00047820
          PVPKUM=PVPKUM+Y(J)*(1.-TIR)                                   00047830
  196     PVUMN=PVUMN+MO*(1.-TIK)/((1+E1)/(1+II))**(J)                  00047840
      C                                                                 00047900
      C       BEGIN COMPUTING PENALTY                                   00048000
      C                                                                 00048100
      C                                                                 00048200
      C       EQUATION (1) - EQUITY INVESTMENT                          00048300
  499     E1=II*Q                                                       00048400
      C                                                                 00048500
      C       EQUATION (2) - INVESTMENT TAX CREDIT                      00048600
              ITC=II*TITC                                               00048700
      C                                                                 00048800
      C       DEPRECIATION CALCULATIONS FROM APPENDIX C                 00048900
      C                                                                 00049000
              DTSMAX=0.                                                 00049100
              LDTS=1                                                    00049200
      C                                                                 00049300
      C       STRAIGHT LINE DEPRECIATION                                00049400
              KMON=NDEP*12                                              00049450
  500     DO 550 J=1,KMON                                               00049500
          D(1,J)=1/(ZNDEP*12.)                                          00049600
  550     PVDTS(1)=PVDTS(1)+D(1,J)/(1.+E1)**J                           00049700
          PVDTS(1)=PVDTS(1)*TIR                                         00049750
          IF(PVDTS(1)-DTSMAX)600,600,560                                00049800
  560     DTSMAX=PVDTS(1)                                               00049900
          LDTS=1                                                        00050000
      C                                                                 00050100
      C       SUM OF YEARS DIGITS                                       00050200
  600     ZN8=ZNDEP*(ZNDEP+1)/2                                         00050300
          DO 650 J=1,NDEP                                               00050400
          DO 651 K=1,12                                                 00050450
          D(2,((J-1)*12+K))=(ZNDEP+1-J)/(ZN8*12)                        00050500
  651     PVDTS(2)=PVDTS(2)+D(2,((J-1)*12+K))/(1.+E1)**((J-1)*12+K)     00050600
  650     CONTINUE                                                      00050650
          PVDTS(2)=PVDTS(2)*TIR                                         00050675
          IF(PVDTS(2)-DTSMAX)700,700,660                                00050700
  660     DTSMAX=PVDTS(2)                                               00050800
          LDTS=2                                                        00050900
      C                                                                 00051000
      C       DOUBLE DECLINING BALANCE                                  00051100
  700     IF(NDEP-1)800,800,705                                         00051200
  705     CUMDEP=0                                                      00051300
          DO 750 J=1,NDEP                                               00051400
          T1=0.                                                         00051450
          DO 751 K=1,12                                                 00051475
          IF (NDEP-2*J+2) 725,710,710                                   00051500
  710     D(3,((J-1)*12+K))=(1-CUMDEP)*2/(ZNDEP*12)                     00051600
          PVDTS(3)=PVDTS(3)+D(3,((J-1)*12+K))/(1.+E1)**((J-1)*12+K)     00051700
          GO TO 751                                                     00051800
  725     D(3,((J-1)*12+K))=(1-CUMDEP)/((ZNDEP-J+1)*12)                 00051900
          PVDTS(3)=PVDTS(3)+D(3,((J-1)*12+K))/(1.+E1)**((J-1)*12+K)     00052000
  751     T1=T1+D(3,((J-1)*12+K))                                       00052050
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                750   CUMDEP=CUMDEP+TI                                        00052100
                      PVDTS(3)=PVDTS(3)*TIR                                   00052150
                      IF(PVDTS(3)-DTSMAX)800,800,760                          00052200
                760   DTSMAX=PVDTS(3)                                         00052300
                      LDTS=3                                                  00052400
C                                                                             00052500
C                     RAPID AMORTIZATION                                      00052600
                800   IF(NDEP-15)790,795,795                                  00052700
                790   FRAPID=1.                                               00052800
                      GO TO 799                                               00052900
                795   FRAPID=15./FNDEP                                        00053000
                799   DO 810 K=4,6                                            00053100
                      DO 801 J=1,KMUN                                         00053200
                      D(K,J)=D(K-3,J)*(1.-FRAPID)                             00053300
                801   PVDTS(K)=PVDTS(K)+D(K,J)/(1.+EI)**J                     00053400
                      DO 805 J=1,60                                           00053500
                      D(K,J)=D(K,J)*FRAPID/60.                                00053600
                805   PVDTS(K)=PVDTS(K)+(FRAPID/60.)/(1.+EI)**J               00053700
                      PVDTS(K)=PVDTS(K)*TIR-TITC*FIDB/2.                      00053800
                      IF(PVDTS(K)-DTSMAX)810,810,808                          00053900
                808   DTSMAX=PVDTS(K)                                         00054000
                      LDTS=K                                                  00054100
                810   CONTINUE                                                00054200
                      IF(LDTS-3)900,900,820                                   00054250
                820   TTC=TI*TITC*(1.-FIDB/2.)                                00054275
C                                                                             00054300
C                                                                             00054400
C                     EQUATION (3) - INITIAL CASH FLOW                        00054410
                900   INIT(1)=EI-TTC                                          00054420
C                                                                             00054430
C                     EQUATION (4) - DEPRECIATION TAX SAVINGS                 00054500
                      DO 950 J=1,KMUN                                         00054600
                950   DEP(J)=TI*D(LDTS,J)*TIR                                 00054605
C                                                                             00054610
C                     CALCULATE CUMULATIVE DEPRECIATION RATE                  00054620
                      DEPCUM(1)=0.                                            00054630
                      DO 601 J=2,KMUN                                         00054640
                601   DEPCUM(J)=DEPCUM(J-1)+D(LDTS,J-1)                       00054650
C                                                                             00054655
C                     EQUATION (5) - BOOK VALUE                               00054660
                      DO 602 J=1,KMUN                                         00054670
                602   BOOK(J)=TI*(1.-DEPCUM(J))                               00054680
C                                                                             00054800
C                     EQUATION (6) - DEBT SHARE OF INVESTMENT                 00054900
                      DBTSHR=TI*B                                             00055000
C                                                                             00055100
C                                                                             00055500
                      DO 604 J=1,KMUN                                         00055600
C                                                                             00055602
C                     EQUATION (7) - PRINCIPAL REPAYMENT                      00055605
                      PRIN(J)=D(LDTS,J)*TI*B                                  00055610
C                                                                             00055700
C                     EQUATION (11) - PRINCIPAL OUTSTANDING                   00055800
                      PRNOUT(J)=TI*B*(1.-DEPCUM(J))                           00056000
C                                                                             00056020
C                     EQUATION (14) - PREFERRED REDEMPTION                    00056040
                      PREF(J)=D(LDTS,J)*TI*F                                  00056060
C                                                                             00056100
C                     EQUATION (17) - PREFERRED OUTSTANDING                   00056200
                      PFOUT(J)=TI*F*(1.-DEPCUM(J))                            00056300
C                                                                             00056400
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C        EQUATION (12) - INTEREST CHARGE                                00056500
         INT(J)=RIN(12*II*B*(1-TTR)*(1-DEPCUM(J))                       00056600
C                                                                       00056700
C        EQUATION (18) - DIVIDENDS PAID                                 00056800
         DIV(J)=RDIV12*II*F*(1-DEPCUM(J))                               00056900
C                                                                       00057000
C        EQUATION (19) - MONTHLY CAPITAL RELATED                        00057100
 605     MCR(J)=-DEP(J)+PRIN(J)+INT(J)+PREF(J)+DIV(J)                   00057200
C                                                                       00057210
C        EQUATION (21) - U & M                                          00057220
         MONUSE=NUSE*12                                                 00057225
         DO 605 J=1,MONUSE                                              00057230
 605     UM(J)=MO*(1.-TTR)*(1.+II)**J                                   00057240
C                                                                       00057300
C        CALCULATE THE NUMBER OF COMPLETE CYCLES                        00057400
         LFULL=30/NUSE                                                  00057500
C                                                                       00057600
C        CALCULATE THE NUMBER OF MONTHS IN THE LAST PARTIAL CYCLE       00057700
         LPART=(30-(NUSE*LFULL))*12                                     00057800
C                                                                       00057900
C        CALCULATE THE MONTHLY CASH FLOWS IN ALL THE FULL CYCLES.       00058000
         DO 606 K1=1,LFULL                                              00058100
         DO 607 J=1,MONUSE                                              00058200
         MCR((K1-1)*MONUSE+J)=MCR(J)*(1.+I)**(NUSE*(K1-1))              00058300
         BOOK((K1-1)*MONUSE+J)=BOOK(J)*(1.+I)**(NUSE*(K1-1))            00058310
         PREOUT((K1-1)*MONUSE+J)=PREOUT(J)*(1.+I)**(NUSE*(K1-1))        00058320
         PRNOUT((K1-1)*MONUSE+J)=PRNOUT(J)*(1.+I)**(NUSE*(K1-1))        00058330
         DEP((K1-1)*MONUSE+J)=DEP(J)*(1.+I)**(NUSE*(K1-1))              00058340
         PREF((K1-1)*MONUSE+J)=PREF(J)*(1.+I)**(NUSE*(K1-1))            00058350
         PRIN((K1-1)*MONUSE+J)=PRIN(J)*(1.+I)**(NUSE*(K1-1))            00058360
 607     UM((K1-1)*MONUSE+J)=UM(J)*(1.+I)**(NUSE*(K1-1))                00058400
         IF(K1.EQ.LFULL.AND.LPART.EQ.0)GO TO 606                        00058500
         INIT(K1*MONUSE)=INIT(1)*(1.+I)**(NUSE*K1)                      00058505
 606     CONTINUE                                                       00058510
C                                                                       00058550
C        CALCULATE CASH FLOWS IN THE LAST PARTIAL CYCLE.                00058600
         DO 609 J=1,LPART                                               00058700
         MCR(MONUSE*LFULL+J)=MCR(J)*(1.+I)**(NUSE*LFULL)                00058800
         BOOK(MONUSE*LFULL+J)=BOOK(J)*(1.+I)**(NUSE*LFULL)              00058810
         PREOUT(MONUSE*LFULL+J)=PREOUT(J)*(1.+I)**(NUSE*LFULL)          00058820
         PRNOUT(MONUSE*LFULL+J)=PRNOUT(J)*(1.+I)**(NUSE*LFULL)          00058830
         DEP(MONUSE*LFULL+J)=DEP(J)*(1.+I)**(NUSE*LFULL)                00058840
         PREF(MONUSE*LFULL+J)=PREF(J)*(1.+I)**(NUSE*LFULL)              00058850
         PRIN(MONUSE*LFULL+J)=PRIN(J)*(1.+I)**(NUSE*LFULL)              00058860
 609     UM(MONUSE*LFULL+J)=UM(J)*(1.+I)**(NUSE*LFULL)                  00058900
         MCF(1)=MCR(1)+UM(1)                                            00058910
         DO 610 J=2,360                                                 00059000
C                                                                       00059010
C        EQUATION 25 - MONTHLY CASH FLOW                                00059020
 610     MCF(J)=MCR(J)+UM(J)+INIT(J)                                    00059100
C                                                                       00059110
C        EQUATION 27 - FINAL DEPRECIATION CASH FLOW                     00059120
         DEPFIN=TTR*BOOK(360)-DEP(360)                                  00059200
C                                                                       00059210
C        EQUATION 31 - FINAL PREFERRED STOCK CASH FLOW                  00059220
         PREFIN=PREOUT(360)-PREF(360)                                   00059300
C                                                                       00059310
C        EQUATION 29 - FINAL PRINCIPAL CASH FLOW                        00059320
         PRNFIN=PRNOUT(360)-PRIN(360)                                   00059325
         PVPCE=0.                                                       00059350
C                                                                       00059360
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672.      C        EQUATIONS (33 & 34) - PRESENT VALUE OF MONTHLY CASH FLOWS.      00059310
673.               DO 611 J=1,360                                                  00059400
674.               PVMCF(J)=MCF(J)/(1.+I1)**J                                      00059500
675.        611    PVPCE=PVPCE+PVMCF(J)                                            00059600
676.               PVPCE=PVPCE+INIT(1)*(-DEPFIN+PRNFIN+PREFIN)/(1.+I1)**360        00059650
677.      C                                                                        00059660
678.      C        EQUATION 35 - MONTHLY CASH FLOWS IN THE DELAYED CASE.           00059670
679.               DO 612 J=1,L                                                    00059700
680.        612    MCFP(J)=0.                                                      00059800
681.               K=360-L                                                         00059850
682.               MCFP(L)=INIT(1)*(1.+I1)**L                                      00059855
683.               DO 613 J=1,K                                                    00059900
684.        613    MCFP(J+L)=MCF(J)*(1.+I1)**L                                     00060000
685.               IF(L.EQ.LPART)MCFP(360)=MCFP(360)-INIT(360-L)*(1.+I1)**L        00060050
686.               PVDEL=0.                                                        00060100
687.               DO 614 J=1,360                                                  00060200
688.        614    PVDEL=PVDEL+MCFP(J)/(1.+I1)**J                                  00060300
689.      C                                                                        00060310
690.      C        EQUATION 36 - FINAL CASH FLOW IN THE DELAYED CASE.              00060320
691.               CFPFIN=(-TIR*BOOK(360-L)+DEP(360-L)                             00060400
692.           &   +PRNOUT(360-L)-PRIN(360-L)                                      00060500
693.           &   +PREFOUT(360-L)-PREF(360-L))*(1.+I1)**L                         00060600
694.      C                                                                        00060610
695.      C        EQUATION 37 - PRESENT VALUE OF THE DELAYED CASE.                00060620
696.               PVDEL=PVDEL+CFPFIN/(1.+I1)**360                                 00060700
697.      C        EQUATION 38 - SAVINGS FROM DELAY                                00060710
698.               SAVING=PVPCE-PVDEL                                              00060800
699.      C                                                                        00060810
700.      C                                                                        00060910
701.      C        EQUATIONS (39 & 40) - CALCULATION OF CAPITAL SAVINGS.           00060920
702.               PVOM=0.                                                         00060930
703.               DO 615 J=1,L                                                    00061000
704.          615  PVOM=PVOM+OM(J)/(1.+I1)**J                                     00061100
705.               SAVCAP=SAVING-PVOM                                              00061200
706.               IF(PVPROM.GT.PVOMN)PVPROM=PVOMN                                 00061300
707.               AM=PVOM-PVPROM                                                  00061400
708.      C                                                                        00062000
709.      C                                                                        00062100
710.      C                                                                        00062200
711.      C                                                                        00062300
712.      C        CONVERT SAVINGS INTO A MONTHLY PENALTY                          00062400
713.      C                                                                        00062500
714.               DENOM=0.                                                        00062605
715.               DO 6010 J=1,L                                                   00062610
716.        6010   DENOM=DENOM+((1.+I1)/(1.+I1))**(J-1)                            00062620
717.      C                                                                        00062622
718.      C        EQUATION 44 - FIRST TERM IN SERIES OF MONTHLY SAVINGS           00062624
719.      C                      EQUIVALENTS.                                      00062626
720.               S1=SAVING/DENOM                                                 00062630
721.      C                                                                        00062632
722.      C        EQUATION 46 - DIVIDE SAVINGS BETWEEN CAPITAL AND O & M.         00062634
723.        6025   SC(1)=(SAVCAP/SAVING)*S1                                        00062700
724.               SU(1)=(AM/SAVING)*S1                                            00062900
725.      C                                                                        00062910
726.      C        EQUATION 47 - CALCULATE CAPITAL AND O & M SERIES.               00062920
727.        6040   DO 6050 K=1,L                                                   00063100
728.               SC(K)=SC(1)*(1.+I1)**(K-1)                                      00063200
729.        6050   SU(K)=SU(1)*(1.+I1)**(K-1)                                      00063300
730.      C                                                                        00063400
731.      C        EQUATIONS (48 & 49) - ADJUSTED SAVINGS EQUIVALENT               00063500
732.        6080   DO 6100 K=1,L                                                   00063600
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                IF(E.NE.1)AC(K)=(1.-X(K))*SC(K)                          00063700
                AU(K)=SU(K)                                              00063800
                IF(AU(K))6090,6100,6100                                  00063900
 6090           AU(K)=0                                                  00064000
 6100           CONTINUE                                                 00064100
C                                                                        00064200
C               EQUATION (50) - PRESENT VALUE OF ADJUSTED SERIES         00064300
                PVADJ=0.                                                 00064400
                DO 6150 K=1,L                                            00064500
 6150           PVADJ=PVADJ+(AC(K)+AU(K))/((1.+E1)**(K-1))               00064600
C                                                                        00064700
C               EQUATIONS (52) & (53) - PENALTY PAYMENT SERIES            00064800
                DENUM=0.                                                 00064900
                DO 6175 K=1,L                                            00065000
 6175           DENUM=DENUM+((1.+I1)/(1.+E1))**(K-1)                     00065100
                P(1)=PVADJ/DENUM                                         00065200
                DO 6200 K=1,L                                            00065300
 6200           P(K)=P(1)*(1.+I1)**(K-1)                                 00065400
C                                                                        00065500
C                                                                        00065600
C               PRINT OUT THE DEPRECIATION METHOD                        00065700
                WRITE(KW,6000)                                           00065800
                WRITE(KW,6000)                                           00065900
                GO TO (6210,6215,6220,6225,6230,6235),LDIS               00066000
 6210           WRITE(KW,6211)                                           00066100
 6211           FORMAT(5X,'STRAIGHT LINE, STANDARD AMORTIZATION')        00066200
                GO TO 6240                                               00066300
 6215           WRITE(KW,6216)                                           00066400
 6216           FORMAT(5X,'SUM OF YEARS DIGITS, STANDARD AMORTIZATION')  00066500
                GO TO 6240                                               00066600
 6220           WRITE(KW,6221)                                           00066700
 6221           FORMAT(5X,'DOUBLE DECLINING BALANCE, STANDARD AMORTIZATION')  00066800
                GO TO 6240                                               00066900
 6225           WRITE(KW,6226)                                           00067000
 6226           FORMAT(5X,'STRAIGHT LINE, RAPID AMORTIZATION')           00067100
                GO TO 6240                                               00067200
 6230           WRITE(KW,6231)                                           00067300
 6231           FORMAT(5X,'SUM OF YEARS DIGITS, RAPID AMORTIZATION')     00067400
                GO TO 6240                                               00067500
 6235           WRITE(KW,6236)                                           00067600
 6236           FORMAT(5X,'DOUBLE DECLINING BALANCE, RAPID AMORTIZATION')  00067700
 6240           CONTINUE                                                 00067800
C                                                                        00067900
C                                                                        00068000
                PVPEN=0.0                                                00068100
                DO 6300 K=1,L                                            00068200
 6300           PVPEN=PVPEN+P(K)/(1.+E1)**(K-1)                          00068300
                WRITE(KW,6000)                                           00068400
C                                                                        00068500
C                                                                        00068600
C               COMPUTE QUARTERLY PENALTY AMOUNTS AND PRINT THEM         00068700
 6308           ZL=L                                                     00068800
                Z6=0                                                     00068900
                NQ=IDINT((ZL-.01)/3.)+1                                  00069000
                DO 6310 J=1,NQ                                           00069100
 6310           Z6=Z6+((1.+I4)/(1.+E4))**(J-1)                           00069200
                QUART(1)=PVPEN/Z6                                        00069300
                IF(NQ-1)6315,6315,6312                                   00069400
 6312           DO 6314 J=2,NQ                                           00069500
 6314           QUART(3*J-2)=QUART(3*J-5)*(1.+I4)                        00069600
 6315           CONTINUE                                                 00069700
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C                                                                       00069800
C       CALCULATE BASE FOR LUMP SUM SETTLEMENT                          00069900
        SETTLE=0.                                                       00070000
        DO 6316 J=1,L                                                   00070100
 6316   SETTLE=SETTLE+QUART(J)/(1.+E1)**(J-1)                           00070200
C                                                                       00070300
        IF(LDPP)7150,7150,6317                                          00070400
 6317   DO 6335 J=1,LDPP                                               00070500
        QUART(LDPP+1)=QUART(LDPP+1)+QUART(J)*(1.+E1)**(LDPP-J+1)        00070600
 6335   QUART(J)=0.                                                     00070700
 7150   IF(UPOST)7151,7151,6390                                         00070800
 7151   WRITE(KW,6000)                                                  00070900
        WRITE(KW,7550)                                                  00071000
 7550   FORMAT(5X,'      MONTH        PAYMENT')                        00071100
        DO 6343 J=1,50                                                  00071200
        IF(QUART(J))6343,6343,6340                                      00071300
 6340   WRITE(KW, 7505)J,QUART(J)                                       00071400
 6343   CONTINUE                                                        00071500
        WRITE(KW,6000)                                                  00071600
C                                                                       00071700
C                                                                       00071800
C                                                                       00071900
C                                                                       00071910
C       COMPUTE THE VALUE OF THE NONCOMPLIANCE PENALTY MDS              00071920
C       MONTHS AFTER THE DATE OF NONCOMPLIANCE                          00071930
        IF(DLUMP)7299,7299,7195                                         00072000
 7195   SETTLE=SETTLE*(1.+E1)**MDS                                      00072100
 7199   WRITE(KW,7200)                                                  00072200
 7200   FORMAT(5X,'THE VALUE OF THE NONCOMPLIANCE PENALTY')             00072300
        WRITE(KW,7201)MDS                                               00072400
 7201   FORMAT(5X,'COMPUTED AS OF',I4,' MONTHS AFTER THE DATE')         00072500
        WRITE(KW,7203)SETTLE                                            00072600
 7203   FORMAT(5X,'OF NONCOMPLIANCE IS',20X,F13.2)                      00072700
        WRITE(KW,7205)                                                  00072800
 7205   FORMAT(57X,8H========)                                          00072900
        GO TO 7299                                                      00073000
C                                                                       00073100
C                                                                       00073200
C       COMPUTE POST-COMPLIANCE SETTLEMENT                              00073300
C                                                                       00073400
C                                                                       00073500
 6390   ZTOTAL=0.0                                                      00073600
        I1O1=DD+L                                                       00073650
 6385   DO 6350 J=1,I1O1                                                00073700
        DELTA(J)= PAID(J)-QUART(J)                                      00073800
        ZTOTAL=ZTOTAL+DELTA(J)                                          00073805
        IF(DELTA(J)+ZTOTAL).GE.0.)GO TO 6351                            00073807
        ZTOTAL=ZTOTAL*(1.+E1)                                           00073810
        GO TO 6350                                                      00073812
 6351   ZTOTAL=ZTOTAL*(1.+K1)                                           00073814
 6350   CONTINUE                                                        00073850
C                                                                       00074100
        WRITE(KW,7580)                                                  00074200
 7580   FORMAT(1X,'MONTH      PAID    PENALTY    DUE EPA    DUE FIRM')  00074300
        DO 6440 J=1,100                                                 00074400
        ZE=0                                                            00074500
        ZF=0                                                            00074600
        IF(QUART(J))6410,6410,6420                                      00074700
 6410   IF(PAID(J))6440,6440,6420                                       00074800
 6420   IF(DELTA(J))6450,6450,6460                                      00074900
 6450   ZE=-DELTA(J)                                                    00075000
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855.                GO TO 6450                                                  000 75100
856.      6460      ZP=DELTA(J)                                                 000 75200
857.      6450      WRITE(KW,9002)J,PAID(J),QUANT(J),ZE,ZP                      000 75300
858.      6440      CONTINUE                                                    000 75400
859.      C                                                                     000 75410
860.      C         EQUATION (56) - TOTAL SETTLEMENT AS OF THE DATE OF SETTLEMENT 000 75420
861.                ZDELAY=ZTOTAL                                               000 75900
862.                WRITE(KW,6000)                                              000 76000
863.                IF(ZDELAY)6461,6461,6465                                    000 76100
864.      6461      ZDELAY=-ZDELAY                                              000 76200
865.                WRITE(KW,7756)ZDELAY                                        000 76300
866.      7756      FORMAT(5X,'SETTLEMENT DUE EPA=',F10.2)                      000 76400
867.                GO TO 6475                                                  000 76500
868.      6465      WRITE(KW,7757)ZDELAY                                        000 76600
869.      7757      FORMAT(5X,'SETTLEMENT DUE FIRM=',F10.2)                     000 76700
870.      6475      CONTINUE                                                    000 76800
871.      C                                                                     000 76900
872.      C                                                                     000 77000
873.      C                                                                     000 77100
874.      C                                                                     000 77200
875.      C         CREATE THE OPTION TO CHANGE SOME OF THE VARIABLES            000 77300
876.      C                                                                     000 77400
877.                WRITE(KW,6000)                                              000 77500
878.                WRITE(KW,6000)                                              000 77600
879.                WRITE(KW,6000)                                              000 77700
880.      7299      CONTINUE                                                    000 77800
881.                WRITE(KW,7300)                                              000 77900
882.      7300      FORMAT(5X,'HOW MANY VARIABLES DO YOU WISH TO CHANGE ',      000 78000
883.           C    '?')                                                        000 78100
884.                READ(KR,*)NLOOP                                             000 78200
885.                IF(NLOOP)99999,99999,2700                                   000 78300
886.      2700      IF(NLOOP-9999)2800,2710,2710                                000 78400
887.      2710      WRITE(KW,7400)                                              000 78405
888.                WRITE(KW,7401)                                              000 78410
889.                WRITE(KW,7402)DPOST                                         000 78415
890.                WRITE(KW,7422)DLIM                                          000 78420
891.                ZF10B=F10B*100.                                             000 78422
892.                WRITE(KW,7535)ZF10B                                         000 78425
893.                WRITE(KW,4005)L                                             000 78430
894.                WRITE(KW,7501)                                              000 78500
895.      7501      FORMAT(5X,'     PRECOMPLIANCE EXPENDITURES')                000 78600
896.                WRITE(KW,7502)                                              000 78700
897.      7502      FORMAT(5X,'       MONTH       CAPITAL          O & M')      000 78800
898.                DO 2715 J=1,L                                               000 78900
899.                ZI=PRECAP(J)+PROM(J)                                        000 78910
900.                IF(ZI)2715,2715,2714                                        000 78920
901.      2714      ZC=PRECAP(J)*(1.+I1)**J                                     000 79000
902.                ZM=PROM(J)*(1.+I1)**J                                       000 79100
903.                WRITE(KW,7505)J,ZC,ZM                                       000 79200
904.      2715      CONTINUE                                                    000 79210
905.      7505      FORMAT(12X,I2,F15.2,F15.2)                                  000 79300
906.                IF(DLIM)2723,2723,2718                                      000 79400
907.      2718      ZMO=MONEW                                                   000 79500
908.                GO TO 2724                                                  000 79600
909.      2723      ZMO=MO*(1.+I1)**L                                           000 79700
910.      2724      WRITE(KW,4020)ZMO                                           000 79800
911.                ZTITC=100*I1TL                                              000 79900
912.                WRITE(KW,4030)ZTITC                                         00080000
913.                ZTITK=100.*I1K                                              00080100
914.                WRITE(KW,4040)ZTITK                                         00080200
915.                ZI=100.*I                                                   00080300
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916.              WRITE(KW,4050)ZI                                    00080400
917.              ZE=100.*E                                           00080500
918.              WRITE(KW,4060)ZE                                    00080600
919.              ZRINT=100.*RINT                                     00080700
920.              WRITE(KW,4070)ZRINT                                 00080800
921.              ZRDIV=100.*RDIV                                     00080900
922.              WRITE(KW,4080)ZRDIV                                 00081000
923.              ZQ=100.*Q                                           00081100
924.              WRITE(KW,4090)ZQ                                    00081200
925.              ZF=100.*F                                           00081300
926.              WRITE(KW,4100)ZF                                    00081400
927.              ZB=100.*B                                           00081500
928.              WRITE(KW,4110)ZB                                    00081600
929.              WRITE(KW,4130)NDEP                                  00081700
930.              WRITE(KW,4140)NUSE                                  00081800
931.              IF(DPUST)9075,9075,2725                             00081900
932.     9075     WRITE(KW,7601)                                      00081905
933.              WRITE(KW,7602)                                      00081910
934.              WRITE(KW,7603)LUPP                                  00081915
935.              WRITE(KW,7560)                                      00081920
936.              WRITE(KW,7561)DLUMP                                 00081925
937.              IF(DLUMP)8001,8001,9076                             00081930
938.     9076     WRITE(KW,7575)                                      00081935
939.              WRITE(KW,7576)                                      00081940
940.              WRITE(KW,7577)MDS                                   00081945
941.              GO TO 8001                                          00081950
942.     2725     WRITE(KW,4190)NPP                                   00081955
943.              WRITE(KW,7524)                                      00082000
944.     7524     FORMAT(5X,'     PENALTY PAYMENTS')                  00082100
945.              WRITE(KW,7525)                                      00082200
946.     7525     FORMAT(5X,'      MONTH          PAYMENT')           00082300
947.              DO 2733  J=1,100                                    00082400
948.              IF(PAID(J))2733,2733,2730                           00082500
949.     2730     WRITE(KW,7505)J,PAID(J)                             00082600
950.     2733     CONTINUE                                            00082700
951.              ZK=K*100.                                           00082800
952.              WRITE(KW,7415)ZK                                    00082900
953.              WRITE(KW,6000)                                      00083000
954.     8001     IF(DLIM)2735,2735,8000                              00083100
955.     8000     WRITE(KW,7440)                                      00083200
956.              WRITE(KW,7441)IOLD                                  00083300
957.              WRITE(KW,6000)                                      00083400
958.              WRITE(KW,7447)                                      00083500
959.              WRITE(KW,7448)MOULD                                 00083600
960.     2735     GO TO 1299                                          00083700
961.     2800     IF(NLOOP.EQ.99)GO TO 100                            00083800
962.              WRITE(KW,9010)                                      00083810
963.     9010     FORMAT(' ENTER A LIST OF VARIABLES TO BE CHANGED',  00083900
964.         E    /,' SEPARATED BY COMMAS.')                          00084000
965.              READ(KR,*)(DEL(J),J=1,NLOOP)                        00084100
966.              DLOOP=2                                             00084200
967.              IF(IERR.GT.0)GO TO 2820                             00084250
968.     2805     DO 2809 J=1,L                                       00084300
969.              PRECAP(J)=PRECAP(J)*(1.+II)**J                      00084400
970.     2809     PROM(J)=PROM(J)*(1.+II)**J                          00084500
971.              II=II*(1.+II)**L                                    00084600
972.              MO=MO*(1.+II)**L                                    00084700
973.     2811     IF(DDIV-1)2820,2820,2812                            00084800
974.     2812     II=II*1000.                                         00084900
975.              MO=MO*1000.                                         00085000
976.              DO 2815 J=1,L                                       00085100
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977.                IF(OPUST)2814,2814,2813                                  00085200
978.      2813      PAID(J)=PAID(J)*1000.                                    00085300
979.      2814      PRECAP(J)=PRECAP(J)*1000.                                00085400
980.      2815      PRUM(J)=PRUM(J)*1000.                                    00085500
981.                DDIV=1                                                   00085600
982.      2820      IERR=0                                                   00085650
983.                DO 9020 JLOOP=1,NLOOP                                    00085700
984.                NVAR=VEL(JLOOP)                                          00085800
985.                GO TO(90,93,97,110,210,220,230,240,250,260,270,300,      00085900
986.               &  280,290,350,320,360,9040,6380,322,417,9070,365,385),NVAR 00086000
987.      3000      CONTINUE                                                 00086100
988.      9020      CONTINUE                                                 00086200
989.                GO TO 420                                                00086300
990.      99999     STOP                                                     00086400
991.                END                                                      00086500
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